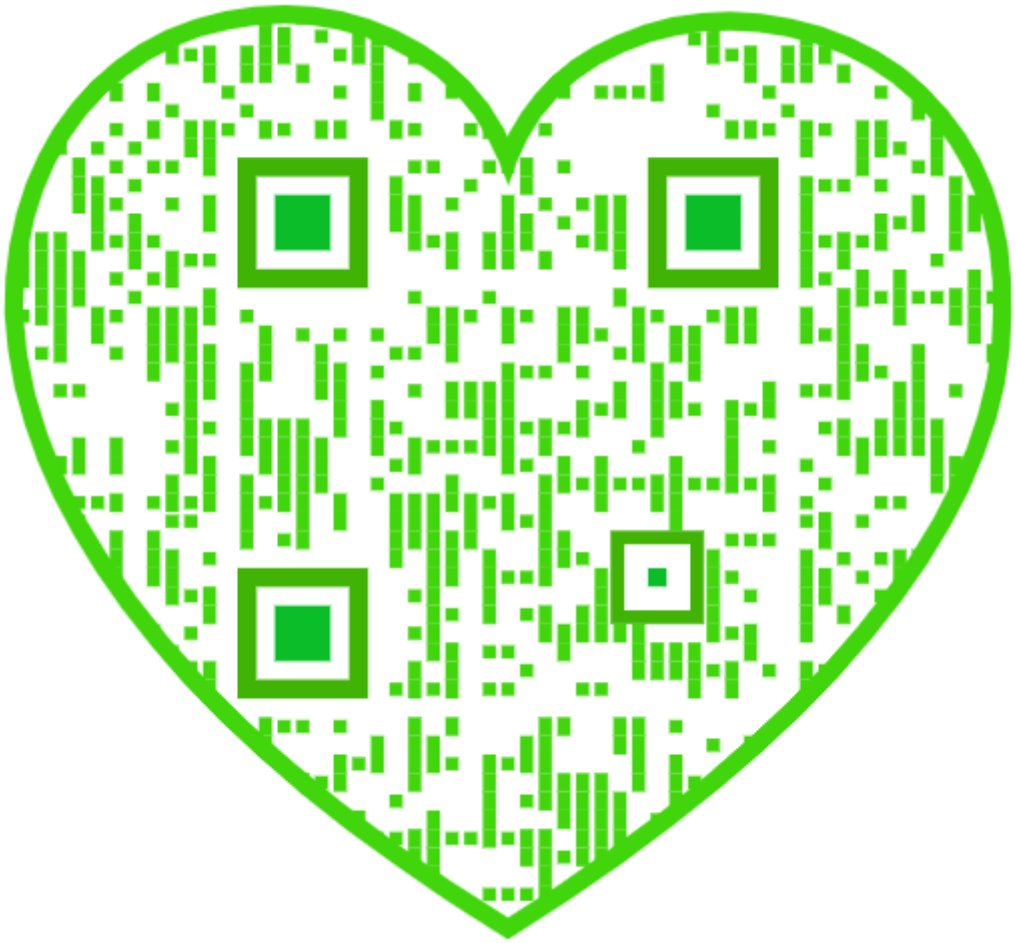

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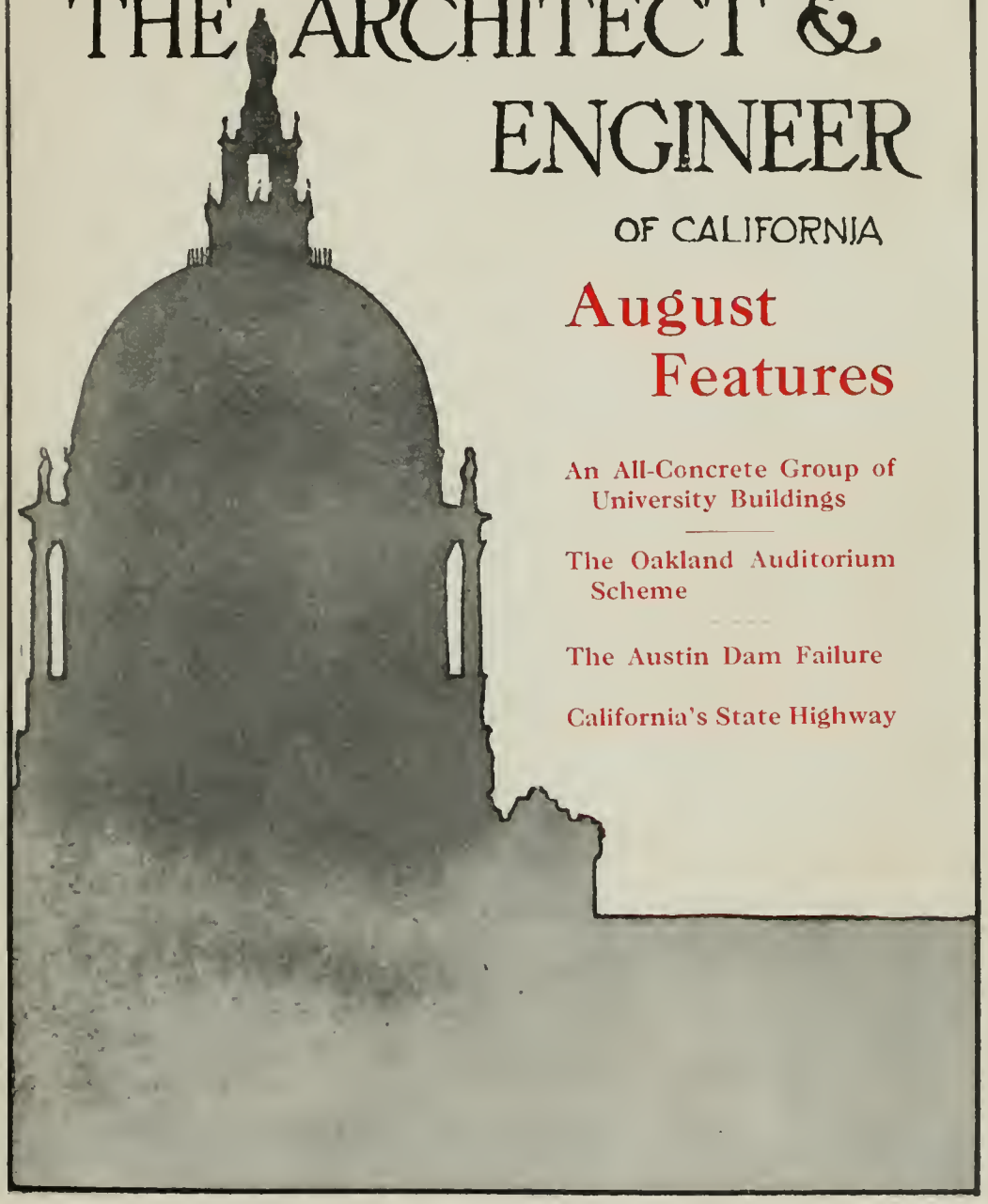

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AUGUST 1912

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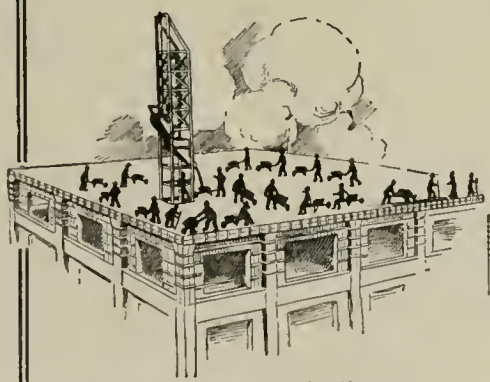

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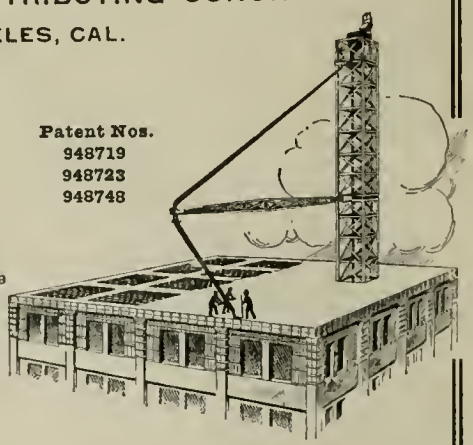

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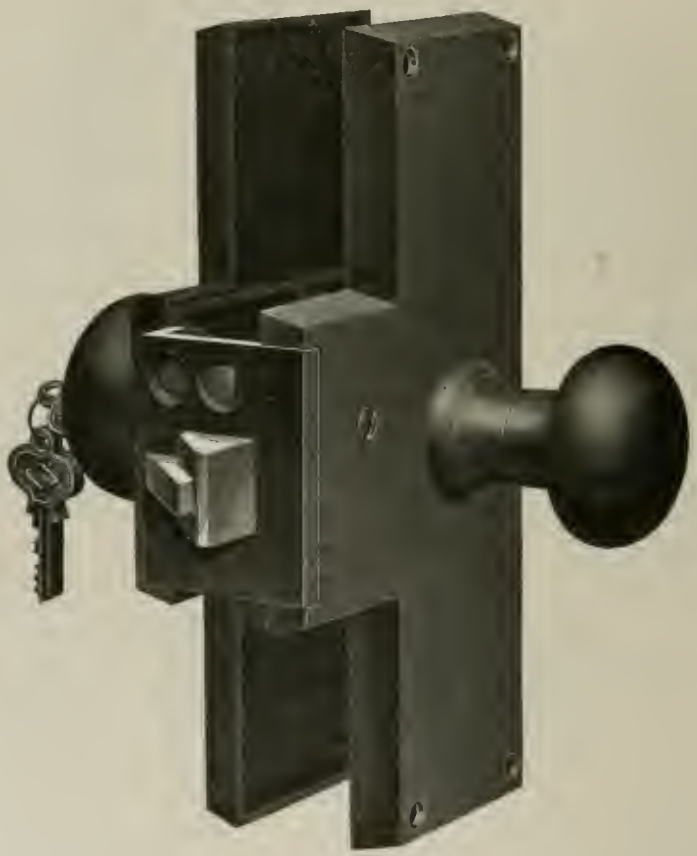

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Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. [See list of distributing agents on page 139.]
Dexter Bros. Company, represented by Sherman, Kimball, Hooker & Lent Bldg. (503 Market St.), San Francisco.
Glidden's Liquid Cement and Liquid Cement Enamel, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
"Wesco."—West Coast Kalsomine Co., 110 Hansford Bldg., S. F.
Buswell's Steel and Concrete Paints Oakland, Cal.
"La Farge," sold by Waterhouse & Price, 59 Third St., S. F.
Medusa White Portland Cement, California Agents, the Building Material Co., Inc., 587 Monadnock Bldg., S. F.
Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

CEMENT EXTERIOR WATERPROOF COATING
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents. Fife Bldg., S. F.

CEMENT EXTERIOR WATERPROOFING
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
Glidden's Liquid Cement and Liquid Cement Enamel, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.

CEMENT FLOOR COATING
Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. [See list of distributing agents on page 139.]
Dexter Bros., Sherman Kimball, Agent, 503 Market St., S. F.
Glidden's Concrete Floor Dressing, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.

CEMENT GUN
Lilley & Thurston Co., distributors for Northern California .....Rialto Bldg., S. F.

CEMENT TESTS
Smith, Emery & Co....651 Howard St., S. F.
Robert W. Hunt & Co., 418 Montgomery St., S. F.
R. E. Noble & Co., Humboldt Bank Bldg., S. F.

CHEMICAL ENGINEERS
Smith, Emery & Co., 651 Howard St., S. F.
Robert W. Hunt & Co., 418 Montgomery Street, San Francisco.
R. E. Noble & Co., Humboldt Bank Bldg., S. F.

CHURCH INTERIORS
Burlingame Cabinet Works, 509-511 Sixth Street, San Francisco.
Fink & Schindler.....218 13th St., S. F.

CLOCKS—TOWER AND STREET
E. Howard Clock Company.....New York
For Pacific Coast agents see advertisement.

COLD STORAGE INSULATION
"Hydrex" Felt & Compound, manufactured by Hydrex Felt & Engineering Co., N. Y.; sold by Rolph, Mills & Co., Metropolis Bank Bldg., S. F.
Neponset Waterdyke Felt and Compound manufactured by F. W. Bird & Son, East Walpole, Mass.; sold by Parrott & Co., 320 California St., S. F.

COMPOSITION FLOORING
Artolith Mfg. Company, 149 Turk St., S. F.
Fibrestone & Roofing Co., 704 Market St., S. F.

CONCRETE CONSTRUCTION
Esterly Construction Co.....Berkeley, Cal.
Foster Vogt Co....722 Hearst Bldg., S. F.
Petersen, H. L. .....62 Post St., S. F.
Ransome Concrete Company, 57 Post St., S. F.
Van Sant-Houghton Company, 503 Market St., S. F.
J. M. White Company....101 Post St., S. F.
Willis A. Clark & Co., 657 Monadnock Bldg., S. F.

CONCRETE MIXERS
Chicago Improved Cube Mixer. Pacific Coast Offices, 338 Brannan St., S. F., and F. T. Crowe & Co.....Portland and Seattle.
Foote Mixers sold by Langford, Bacon & Myers.....215 Rialto Bldg., S. F.
Ransome Mixers, sold by Norman B. Livermore & Co....Metropolis Bank Bldg., S. F.
Planetary Mixers, manufactured by Enterprise Foundry Co...200 Second St., S. F.

CONCRETE PILES
Portland Concrete Pile & Equipment Co., Phelan Bldg., S. F.

CONCRETE POURING APPARATUS
Concrete Appliances Co., Los Angeles; Parrott & Co., Coast Representatives, San Francisco, Portland, Seattle.

CONCRETE REINFORCEMENT
Clinton Fireproofing System, L. A. Norris, Monadnock Bldg., S. F.
International Fabric & Cable, represented by Western Builders' Supply Co., 680 Mission St., S. F.
Plain and Twisted Bars, sold by Baker & Hamilton, San Francisco, Los Angeles and Sacramento.
Triangle Mesh Fabric, Sales Agents, The Lilley & Thurston Co....Rialto Bldg., S. F.
Twisted Bars, sold by Wonds & Huddart, 444 Market St., S. F.

Specify... For Plastering

HOLMES DIAMOND SANTA CRUZ LIME

PHONE KEARNY 2220
Guaranteed Against Pitting or Popping

The Holmes Lime Co.
Monadnock Bldg., San Francisco

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Specialists in **FAIENCE MANTELS** and Designs gotten out for Architects in any Mantel or Floor Tile Work. Estimates gladly given. Complete line of Fireplace Fixtures. Visit our Store.

WATSON MANTEL & TILE CO.

457 MARKET STREET, PHONE SUTTER 1687.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

CONCRETE SURFACING
"Alkacene" Liquid Concrete, Boyd & Moore, 356 Market St., S. F.
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
Buswell's Steel and Concrete Paints, Oakland, Cal.
"Concreta," sold by W. P. Fuller & Co., S. F.
Concreto, Worden-Meeker Varnish Co., S. F. and Oakland.
Glidden Liquid Cement, manufactured by Glidden Varnish Company, Whittier, Coburn Co., San Francisco and Los Angeles, Pacific Coast Distributors.
WESCO—West Coast Kalsomine Co., 110 Hansford Bldg., S. F.

CONSTRUCTION MATERIAL
Electric Appliance Co., 807 Mission St., S. F.

CONSTRUCTION MANAGERS
Geo. H. Stoffels Co., ...Pacific Bldg., S. F.

CONTRACTORS, GENERAL
Commary-Peterson Co., Inc., 46 Kearny St., S. F.
Elam, Thos. & Son, Builders' Exchange, S. F.
Esterly Construction Co.....Berkeley, Cal.
F. O. Engstrum Co., East Fifth and Seaton Sts., Los Angeles.
Foster, Vogt Co.....722 Hearst Bldg., S. F.
Geo. H. Stoffels & Co., 830 Pacific Bldg., S. F.
Geo. W. Boxton.....Hearst Bldg., S. F.
Hansen, F. L., 525 Monadnock Bldg., S. F.
Holm & Son.....Foxcroft Bldg., S. F.
Harvey A. Klyce.. ..Monadnock Bldg., S. F.
McLaren & Peterson, 706-707 Williams Bldg., S. F.
C. P. Moore Building Co., Monadnock Bldg., S. F.
Locke Construction Company, Crocker Bldg., S. F.
Northern Construction Co., Mills Bldg., S. F.
William H. Henning..Examiner Bldg., S. F.
Ransome Concrete Co., 1218 Broad'y, Oakland
Rickon-Ehrhart Eng. & Const. Co., 1859 Geary St., S. F.
Robert Trost...26th and Howard Sts., S. F.
Peterson & Wilson.....1113 Post St., S. F.
Wm. Bateman.....1915 Bryant St., S. F.
Van Sant-Houghton Co., 503 Market St., S. F.
Williams Bros. & Henderson, 351 Monadnock Bldg., S. F.
J. M. White.....101 Post St. S. F.

CORNER BEAD
Hunt Metal Corner Co., 201 Devonshire St., Boston, Mass.

CORNER BEAD, Continued
"Prescott," sold by Boyd & Moore, 356 Market St., S. F.
Union Metal Corner Company, 144 Pearl St., Boston, represented on the Pacific Coast by Waterhouse & Price.

CRUSHED ROCK
Natomas Consolidated of California, Peoples Savings Bank Bldg., Sacramento, Cal.
Niles Rock, sold by California Building Material Company.....Pacific Bldg., S. F.
J. P. Holland.....Army St. Wharf, S. F. Phone Mission 5466.
Niles Sand, Gravel & Rock Co., Mutual Savings Bank Bldg., S. F.

CORK TILING
Nonpareil Cork Tiling, David E. Kennedy, Inc., N. Y. Pacific Coast office, Phelan Building, S. F., G. H. Freear, Mgr.

DAMP-PROOFING COMPOUND
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
Biturine Co. of America, 24 California St., S. F.
Glidden's Liquid Rubber, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
"Hydrex" Felt & Compound, manufactured by Hydrex Felt & Engineering Co., New York, sold by Rolph, Mills & Co., Metropolis Bank Bldg., S. F.
"Pabco" Damp Proofing Compound, sold by Paraffine Paint Co.....34 First St., S. F.
Parrott & Co., agents for Genasco Positive Seal Damp Proof Paint.
"Protectorine," Compound, sold by Boyd & Moore.....356 Market St., S. F.
H. D. Samuel Co....Monadnock Bldg., S. F.
WESCO—West Coast Kalsomine Co., 110 Hansford Bldg., S. F.

DOOR HANGERS
Pitcher Hanger, sold by Pacific Tank Company.....231 Berry St., S. F.
Reliance Hanger, sold by Sartorius Co., S. F.; D. F. Fryer & Co., Louis R. Bedell, Los Angeles, and Portland Wire & Iron Works.

DOOR OPENER
G. Rischmuller, Builders' Ex., and 3442 19th St., S. F.

DOORS—DISAPPEARING
Pacific Tank & Pipe Co.,231 Berry St., S. F.

CALIFORNIA MARBLE

Seven Different Grades— Superior Finish —Moderate Price

Used in the New San Francisco Hall of Justice, Merchants Exchange Building, Alaska Commercial Building, and others.

COLUMBIA MARBLE COMPANY

268 MARKET STREET, Rooms 201-202 **SAN FRANCISCO, CAL.**

ARCHITECTS' SPECIFICATION INDEX—*Continued*

DOORS—SCREEN
Higgin Mfg. Co., represented by Mailler Searles.....817 Monadnock Bldg., S. F.

DOORS AND SHUTTERS
Kinnear Steel Rolling Doors and Shutters, Lilley & Thurston Co., Rialto Bldg., S. F.

DOORS—WAREHOUSE
"Cross" Horizontal Folding Doors, Boyd & Moore, Agents.....356 Market St., S. F.
Wells & Spencer Machine Company, 173 Beale St., S. F.

DUMB WAITERS
Energy Dumb Waiters, Boyd & Moore, Agents.....356 Market St., S. F.

ELECTRICAL CONTRACTORS
American Electrical Engineering Co. 435 Golden Gate Ave., S. F.
Butte Engineering Co..683 Howard St., S. F.
Central Electric Co..185 Stevenson St., S. F.
Davis & Doman Electric Co., 1220 Webster St., S. F.
Electric Appliance Co., 807 Mission St., S. F.
Garden City Electrical Co.....San Jose, Cal.
Jno. G. Sutton Co.....243 Minna St., S. F.
Pacific Fire Extinguisher Company, 507 Montgomery St., S. F.

ELEVATORS
Otis Elevator Company, Stockton and North Point, S. F.
Van Emon Elevator Co..54 Natoma St., S. F.
Wells & Spencer Machine Co., 173 Beale St., S. F.

ELEVATOR CARS
Cleveland Art Metal Co., Boyd & Moore, Agents .....356 Market St., S. F.

ELEVATOR DOORS
"Cross" Elevator Doors, Boyd & Moore, Inc., Agents.....356 Market St., S. F.
Dahlstrom Metallic Door Co., Rialto Bldg., S. F.

ELEVATORS, SIGNALS, FLASHLIGHTS AND DIAL INDICATORS
Elevator Supply & Repair Co., 593 Market St., S. F.

ENGINEERS
F. J. Amweg.....700 Marston Bldg., S. F.
W. W. Breite.....Clunie Bldg., S. F.
J. C. Hurley..... 12 Geary Street, S. F.
Hunter & Hudson, Monadnock Bldg., S. F.
Rickon & Ehrhart, 1859 Geary St., S. F.
Van Sant-Houghton Co., 503 Market St., S. F.

EXPRESS CALL SYSTEM
Elevator Supply & Repair Co., 593 Market St., S. F.

FIRE ESCAPES
Pacific Structural Iron Works, Structural Iron and Steel, Fire Escapes, etc. Phone Market 1374; Home, J 3435..370-84 Tenth St., S. F.
H. Johns-Manville Company, Branches in all Principal Coast Cities.

FIRE EXTINGUISHERS
Marshall & Schimpf.....Clunie Bldg., S. F.
Pacific Fire Extinguisher Co., 507 Montgomery St., S. F.

FIREPLACE DAMPER
Head, Throat and Damper for open fireplaces, Colonial Fireplace Co., Chicago. (See advertisement for Coast agencies.)

FIREPROOFING
Gladding, McBean & Company, Crocker Bldg., S. F.
Los Angeles Pressed Brick Co., Frost Bldg., L. A.
Roehling Construction Co., Crocker Bldg., S. F.

FIRE PROTECTION—SPRINKLER SYSTEM
Jno. G. Sutton Co....243 Minna St., S. F.
Pacific Fire Extinguisher Company, 507 Montgomery St., San Francisco; Branch Offices, Portland, Seattle and Spokane.
Marshall & Schimpf.....Clunie Bldg., S. F.

FIXTURES—BANK, OFFICE, STORE, ETC.
Burlingame Cabinet Works, 509-511 Sixth Street, San Francisco
A. J. Forbes & Son..1530 Filbert St., S. F.
Fink & Schindler.....218 13th St., S. F.
T. H. Meek Company..1157 Mission St., S. F.
C. F. Weber & Co., 365 Market St., San Francisco and 210 N. Main St., Los Angeles, Cal.

FLOOR TILING
Watson Mantel & Tile Co., 457 Market St., S. F.

FLOOR VARNISH
Bass-Hueter and S. F. Pioneer Varnish Works, 816 Mission St., S. F.
R. N. Nason & Co...151 Potrero Ave., S. F.
Standard Varnish Works, Chicago, New York and S. F.
Worden-Meeker Varnish Works, S. F. and Oakland

FLOORS—CORK
Nonpariel Cork Tiling, David E. Kennedy, Inc., N. Y. Distributor for the Pacific Coast, G. H. Freear, Phelan Building, S. F.

FLOORING—MAGNESITE
Mallott & Peterson, 682 Monadnock Bldg., S. F.

GAS PLATE CABINETS
Modern Cabinet Company, 1217 Divisadero St., S. F.
Pacific Hardware & Steel Co., San Francisco, Los Angeles and Portland.
A. W. Pike.....711 Mission St., S. F.

GARAGE EQUIPMENT
Bowser Gasoline Tanks and Outfit, Bowser & Co. .....612 Howard St., S. F.

GARBAGE BURNERS
Water Heating Garbage Burners, sold by Cal. Hydraulic Eng. & Supply Co., 70 Fremont St., S. F.

GARBAGE CHUTE
Bill & Jacobsen.....524 Pine St., S. F.

GLASS AND GLAZING
California Plate and Window Glass Company, 864 Mission St., San Francisco.
W. P. Fuller & Co., San Francisco, Los Angeles and Portland.

GRAPHITE
Detroit Graphite Co..301 Hearst St., S. F.

GRAVEL, SAND AND CRUSHED ROCK
Bay Development Co.....153 Berry St., S. F.
California Building Material Co., Pacific Bldg., S. F.
Del Monte White Sand, sold by Pacific Improvement Co.....Crocker Bldg., S. F.
Grant Gravel Co.....87 Third St., S. F.
J. P. Holland.....Army St. Wharf, S. F.

HARD WALL PLASTER
Empire Hard Wall Plaster, sold by Pacific-Portland Cement Co., Pacific Bldg., S. F.
Reno Hard Wall Plaster, sold by Western Building Material Co., 430 California St., S. F.

HARDWARE
Brittain & Co....San Francisco and Oakland.
Russwin Hardware, Joost Bros., S. F.

HARDWOOD FLOORING
Boyd & Moore.....356 Market St., S. F.

WILLIAM H. FORD J. H. PLUNKETT W. H. MALOTT Telephone Sutter 329

FIBRESTONE & ROOFING CO. ...Succeeding... FORD & MALOTT

FELT, ASPHALT AND GRAVEL ROOFING CONTRACTORS

"FIBRESTONE" MAGNESITE FLOORING. Office, 904-905 MUTUAL SAVINGS BANK BLDG.

Warehouse and Yard: Mariposa St., at Iowa St., San Francisco. Mem. Builders' Ex., Gen. Contractors' Assn

WELLS AND SPENCER MACHINE CO.
F. M. SPENCER, SUCCESSOR
173-177 BEALE ST., SAN FRANCISCO
REPRESENTING
WESTERN ELEVATOR COMPANY
REPAIRS, INSPECTIONS AND DUMB WAITERS
TELEPHONES: KEARNY 664 HOME J 1124

ARCHITECTS' SPECIFICATION INDEX—*Continued*

HARDWOOD FLOORING, Continued
Dieckmann Hardwood Co., Beech St., cor. Taylor, S. F.
E. A. Howard & Co., 20 Howard St., S. F.
Strable Mfg. Co.....Oakland, Cal.
New York Hardwood Floor Co., 784 O'Farrell St., S. F.
Parrott & Co.....320 California St., S. F.
White Bros., Cor. Fifth and Brannan Sts., S. F.
Hardwood Interior Co., 554 Bryant St., S. F.

HARDWOOD LUMBER
Dieckmann Hardwood Co., Beach St., cor. Taylor, S. F.
Parrott & Co.....320 California St., S. F.
Strable Mfg. Co., First St., betw. Washington & Clay, Oakland.
White Bros., Cor. Fifth and Brannan Sts., S. F.

HARDWOOD VENEER PANELS AND DOORS
E. A. Howard & Co....Howard St., S. F.

HEATERS—AUTOMATIC
Hoffman Heater, sold by Holbrook, Merrill & Stetson, San Francisco and Los Angeles.
Humphrey Co., 565 N. Rose St., Kalamazoo, Mich.
Pittsburg Water Heater, sold by Thos. Thieben & Co. .....667 Mission St., S. F.

HEATING ENGINEERS
General Engineering Co., 231-3-5 Natoma St., S. F.

HEATING EQUIPMENT—VACUUM, ETC.
C. A. Dunham Co., Marshalltown, Iowa, Western Division Office, Monadnock Bldg., S. F.
Guernsey & Wheeler, ...Rialto Bldg., S. F.
Marshall & Schimpf.....Clunie Bldg., S. F.

HEATING AND VENTILATING
Atlas Heating & Ventilating Co., Fourth and Freelon Sts., San Francisco.
Fess System Co.....220 Natoma St., S. F.
Guernsey & Wheeler....Rialto Bldg., S. F.
Gilley-Schmid Co., Inc., Thirteenth and Mission Sts., S. F.
General Engineering Company, 281 Natoma St., S. F.
Hoffman & Meusser, 1129-1131 Howard St., San Francisco.
J. C. Hurley..... 12 Geary Street, S. F.
S. T. Johnson Co.....1334 Mission St., S. F.
Mangrum & Otter, Inc., 507 Mission St., S. F.
H. W. Moffat, ...Pacific Bldg., S. F...
Jno. G. Sutton Co....243 Minna St., S. F.
Pacific Blower & Heating Co., 17th St., betw. Mission and Valencia, S. F.
Pacific Fire Extinguisher Company, 507 Montgomery St., S. F.
Petersen-James Co....710 Larkin St., S. F.

HINGES
Stanley's Ball-Bearing Hinges, Stanley Co., New Britain, Conn.

HOTELS
The Angelus, Loomis Bros.....Los Angeles

ICE MAKING MACHINES
"The Wizard," sold by the De Laval Dairy Supply Co., Drumm and Sacramento streets, San Francisco.

INGOT IRON
American Rolling Mill Co., Middleton, Ohio.
California Corrugated Culvert Co., 5th and Parker Sts., West Berkeley.

INLAID FLOORS
Hardwood Interior Co., 554 Bryant St., S. F.

INTERIOR WOODWORK
New York Hardwood Floor Co., 784 O'Farrell St., S. F.

INSPECTIONS AND TESTS
R. E. Noble & Co., Humboldt Bank Bldg., S. F.
Robert W. Hunt & Co., 418 Montgomery St., S. F.
Smith, Emery & Co. Inc., 651 Howard St., S. F.

INSULATING MATERIALS
Armstrong Cork Co..... Pittsburg, Pa.

INSURANCE
David Duncan.....340 Sansome St., S. F.

INTERIOR DECORATING
The Tozer Company, 228 Grant Ave., S. F.

JOIST HANGERS
Western Builders' Supply Co., 680 Mission St., S. F.

KITCHEN BOILERS
Victor Boiler Co., Fourth and Washington Sts., Oakland

KITCHEN EQUIPMENT
John G. Ils & Co....855 Mission St., S. F.

LANDSCAPE ENGINEERS
MacRorie & McLaren Co., Westbank Bldg., S. F.

LIME
J. P. Holland.....Army St. Wharf, S. F.
Holmes Lime Company, Monadnock Bldg., S. F.
Shasta Lime Products Company, 1550 Bryant St., S. F.

LIGHTING FIXTURES
Adams & Hollopeter....745 Mission St., S. F.
Bauer Fixture Co.....49-55 Jones St., S. F.

LIGHT, HEAT AND POWER
Pacific Gas & Elec. Co..445 Sutter St., S. F.

LOCKERS—METAL
Hart & Cooley Co., Boyd & Moore, Agents, 356 Market St., S. F.

LUMBER
Sunset Lumber So.....Oakland, Cal.
Santa Fe Lumber Co., Seventeenth and De Haro Sts., S. F.

MANTELS
Mangrum & Otter ....561 Mission St., S. F.
S. Ginsberg & Co.....1029 Larkin St., S. F.
Watson Mantel & Tile Co., 457 Market St., S. F.
Thos. F. Rigney, ...9 City Hall Ave., S. F.

MARBLE
Columbia Marble Co...268 Market St., S. F.

METAL AND STEEL LATH
Baker & Hamilton, 433 Brannan St., S. F.
Roebling Construction Co., Crocker Bldg., S. F.
L. A. Norris & Co., Monadnock Bldg., S. F.

METAL CEILINGS
Berger Mnfg. Co....1120 Mission St., S. F.
San Francisco Metal Stamping & Corrugating Co.....Treat Ave. and 19th St., S. F.

METAL DOORS AND WINDOWS
Capitol Sheet Metal Works, 1927 Market St., S. F.
Dahlstrom Metallic Door Co., Western office, Rialto Bldg., S. F.
S. Ginsberg & Co., 1029 Larkin St., S. F.
Rulofson Metal Window Works, Eighth and Brannan Sts., San Francisco.
Fink & Schindler Co., 218 13th St., S. F.

METAL SHINGLES
Meurer Bros., J. A. McDonald, Pacific Coast Agent.... Third, near Townsend St., S. F.

Opera Chairs

Theatre Chairs and School Desks
At ONE DOLLAR EACH
Write for Particulars *"Everything in Seating"*
WHITAKER & RAY-WIGGIN CO., SAN FRANCISCO

School Desks

ARCHITECTS' SPECIFICATION INDEX—*Continued*

METAL SHINGLES, Continued
San Francisco Metal Stamping & Corrugating Co.....Treat Ave. and 19th St., S. F.
L. B. Hooker Co., 1530 Howard St., S. F.

MIXERS
Enterprise Foundry Co., 200 2d St., S. F.

OIL BURNERS
S. T. Johnson Co...1334 Mission St., S. F.
Fess System Co.....220 Natoma St., S. F.
T. P. Jarvis Crude Oil Burner Co., 275 Connecticut St., S. F.

OFFICE FURNITURE
Modern Cabinet Company, 1217 Divisadero St., S. F.

OPERA CHAIRS
C. F. Weber & Co....365 Market St., S. F.
Whitaker & Ray-Wiggin Co., San Francisco and Los Angeles.

ORNAMENTAL IRON AND BRONZE
J. G. Braun.....Chicago and New York
California Artistic Metal and Wire Company, San Francisco.
Ralston Iron Works, 20th and Indiana Sts., S. F.
Standard Company, represented by Mailler Searles.....817 Monadnock Bldg., S. F.
Standard Iron Works, 235-39 Shipley St., S. F.
Golden Gate Structural & Ornamental Iron Works .....1479 Mission St., S. F.
C. J. Hillard Company, Inc., 211-215 8th St., S. F.
West Coast Wire & Iron Works, 861-863 Howard St., S. F.

PAINT FOR STEEL STRUCTURES
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
Buswell's Steel and Concrete Paints, Oakland, Cal.
Detroit Superior Graphite Paint, manufactured by Detroit Graphite Company. C. W. Pike Company, Coast Sales Agents, 22 Battery St., S. F.
Glidden's Acid Proof Coating, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.

PAINT FOR CEMENT
Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. (Inc.), [See adv. in this issue for Pacific Coast agents.]
Glidden's Liquid Cement, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
Vitrolite Cold Water Paint, sold by Boyd & Moore.....356 Market St., S. F.

PAINTS, OILS, ETC.
Bass-Hueter Paint Company, Mission, near Fourth St., S. F.
R. N. Nason Company.....San Francisco
"Biturine," sold by Biturine Co. of America, 24 California St., S. F.
Glidden Varnish Co., Cleveland, Ohio, represented by Whittier-Coburn Co., S. F. and Los Angeles
Paraffine Paint Co....38-40 First St., S. F.
Standard Varnish Works, represented by W. P. Fuller & Co., S. F. and Los Angeles.
Wesco—West Coast Kalsomine Co., 110 Hansford Bldg., S. F.
Worden-Mecker Varnish Co., S. F. & Oakland.

PHOTO ENGRAVING
California Photo Engraving Co., 121 Second St., S. F.

PHOTOGRAPHY
Arthur J. Brunner Co.,..47 Kearny St., S. F.
Gabriel Moulin.....153 Kearny St., S. F.
Walter Scott.....558 Market St., S. F.

PIPE—CORRUGATED INGOT IRON
California Corrugated Culvert Company, Los Angeles and West Berkeley.

PIPE—VITRIFIED SALT GLAZED TERRA COTTA.
N. Clark & Sons, 112 Natoma St., San Francisco
Gladding McBean & Co., Crocker Bldg., S. F.
Pacific Sewer Pipe Company, I. W. Hellman Bldg., Los Angeles
Steiger Terra Cotta and Pottery Works, Mills Bldg., S. F.

PLASTER
Empire Plaster, The Nevada Gypsum Co., Pacific Bldg., S. F

PLASTER WALL BOARD AND WOOD FIBRE
Mound House Plaster Co., Monadnock Bldg., S. F

PLASTERING CONTRACTORS
Geo. MacGruer....319 Mississippi St., S. F

PLUMBING
J. E. O'Mara. .....443 Minna St., S. F.
Jno. G. Sutton Co.....243 Minna St., S. F.
Peterson-James Co.....710 Larkin St., S. F
Wetzel & Grass,.....105 Fulton St., S. F
Wittman, Lyman & Co., 315 Polk St., S. F

PLUMBING FIXTURES, MATERIALS, ETC
Crane Co....Second and Brannan Sts., S. F.
Jno. Douglas Co....571 Mission St., S. F.
Haines, Jones & Cadbury Co., 851-859 Folsom St., S. F.
P. F. Howard Co., Second and Folsom Sts., S. F
Louis Lipp Company, Winton Place, Ohio. Pacific Coast Office, 693 Mission St., S. F
Mark-Lally Co..First and Folsom Sts., S. F.
J. L. Mott Iron Works, D. H. Gulick, selling agent .....135 Kearny St., S. F.

PLUMBERS' SUNDRIES
Orca Sanitary Toilet Seat, manufactured by Orca Mfg. Co., 700 Hooker & Lent Bldg., S. F.

GEORGE PETERSON G. HAZELTON WILSON

PETERSON & WILSON

JOBBING, STORE AND OFFICE FITTING
Contractors and Builders
TELEPHONE FRANKLIN 4677

1113 POST STREET, between Van Ness and Polk *SAN FRANCISCO*

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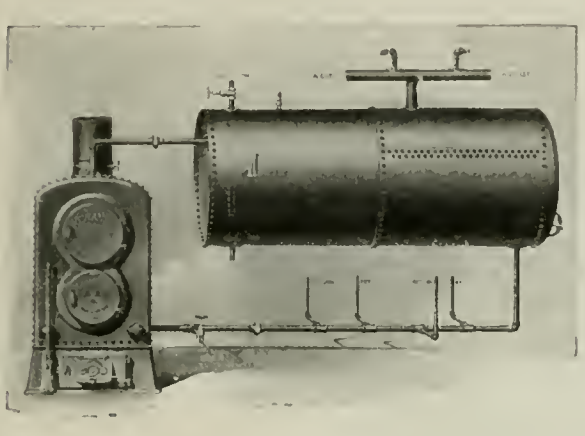

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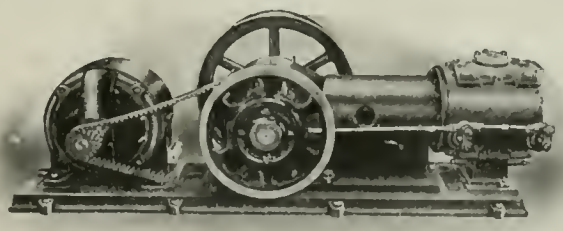

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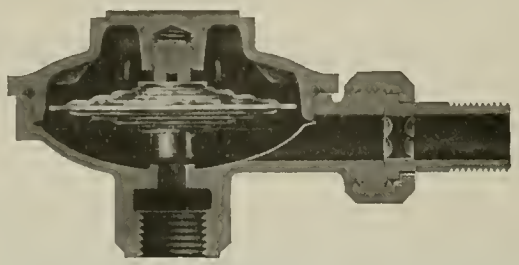

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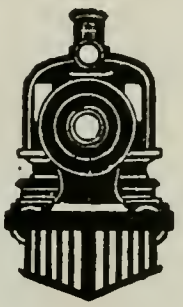

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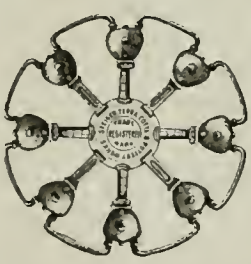

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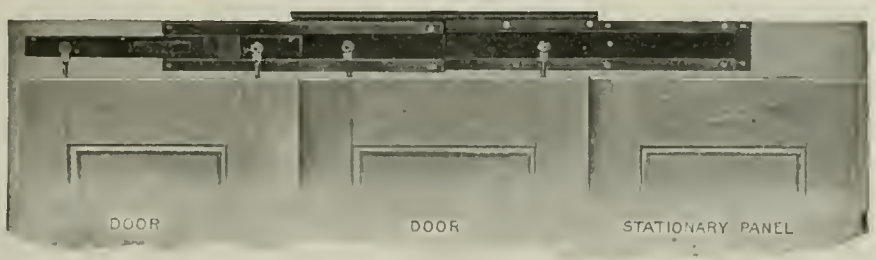

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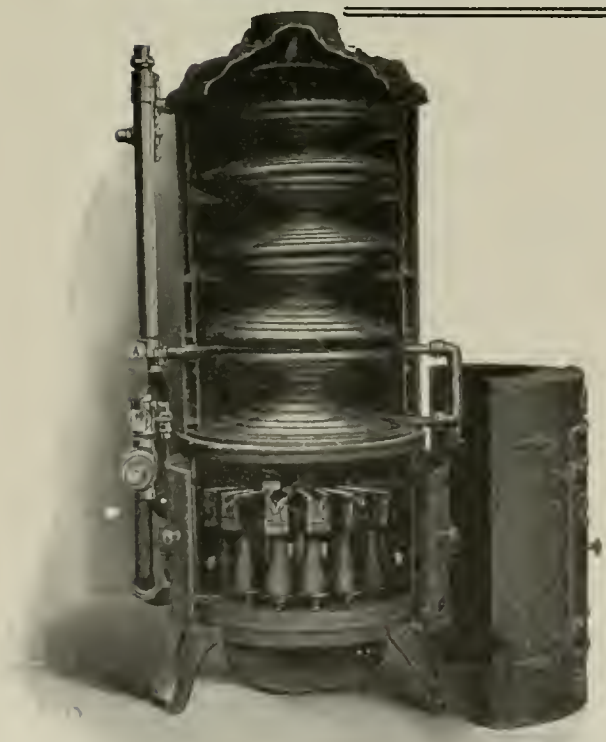

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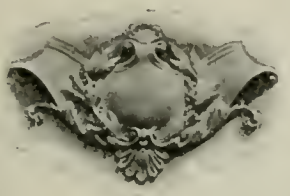

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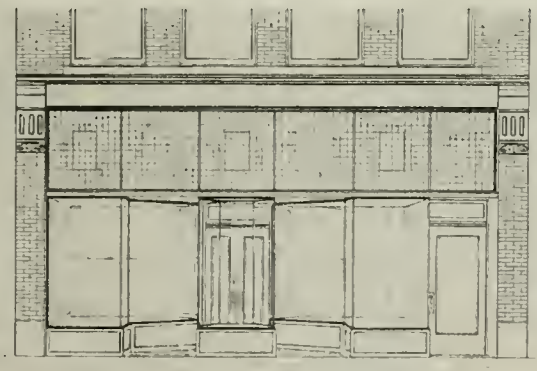

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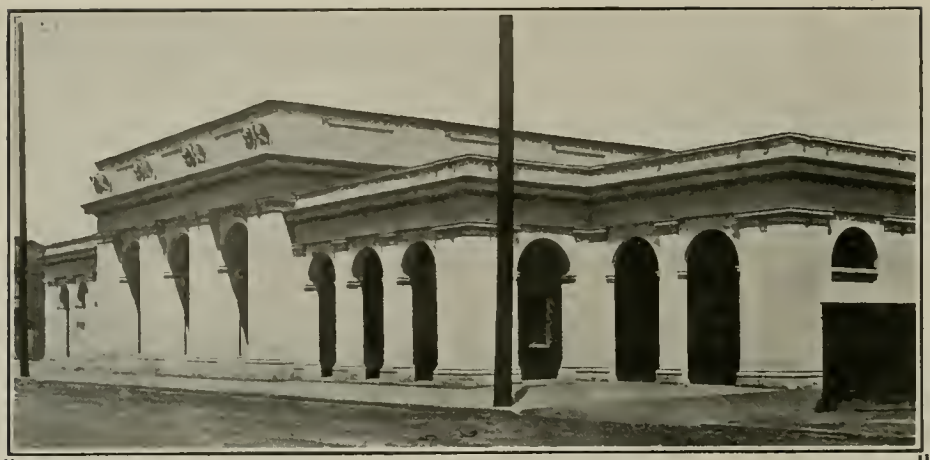

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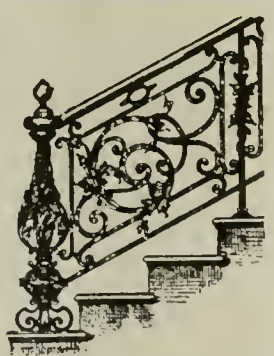

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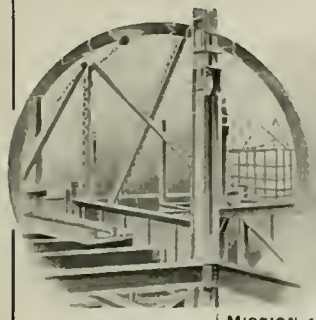

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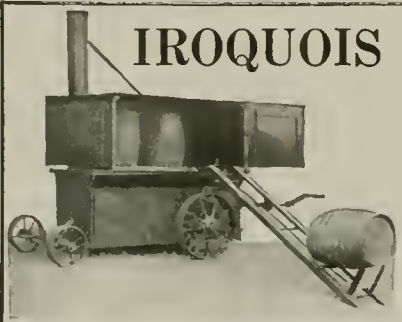

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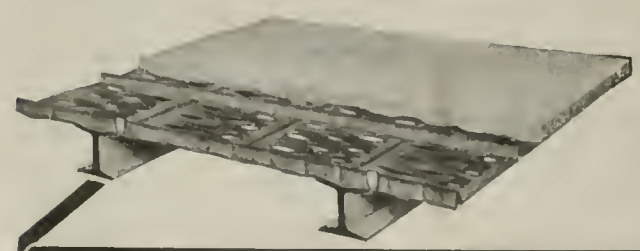

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Frontispiece,
The Architect and Engineer of California,
August, 1912.

BIRDSEYE VIEW OF THE NEW SANTA CLARA UNIVERSITY, SANTA CLARA, CALIFORNIA.
W. D. Shea, Architect.

THE
Architect and Engineer
Of California
Pacific Coast States

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An All-Concrete Group of University Buildings

THE accompanying illustrations show a birdseye view of the Santa Clara University buildings as they will appear when completed, and one of the buildings in the scheme which already has been constructed. The buildings have been planned to permit wide space for lawns, greenery and shade trees. The grounds are ample to give each structure in the group a proper and beautiful setting. Full advantage has been taken of the grounds and of its location in the sunny Santa Clara Valley. The buildings are in perfect harmony with this spot, historic for its mission, and one of the most charming sections in the State.

The buildings for the University of Santa Clara will consist of about 12 in number, located on the old site of the institution at Santa Clara. They are designed in the Mission style of architecture, and are constructed of reinforced concrete throughout. This form of construction lends itself admirably to the style of architecture. The white Medusa finish, red tile roof and mission arched colonnades, will be striking features of the structures surrounding the quadrangle. The administration building will form the central unit of the group; the right wing of which will be devoted to the students' chapel and the left wing and center portion of the building to the library, museum and debating society halls.

The faculty building, located to the left of the center or administration building, has been completed and is now occupied by the faculty of the University. This building is a three-story structure, 200 feet long and 40 feet wide. On the first floor are the rector's and procurator's offices, reception rooms, and the fathers' chapel. The second and third floors are given over to the living rooms and studies of the fathers and scholastics. The fathers' library with a capacity of 25,000 volumes, extends in three galleries or tiers over the chapel. The roof of the building, reached by spacious stair towers, will be used as an open-air recreation place by the fathers.

The senior hall on the right of the center or administration building is now near completion, and will be ready for occupancy soon after the beginning of the new term. It corresponds in a general way with the faculty building, and forms a unit in the central group.

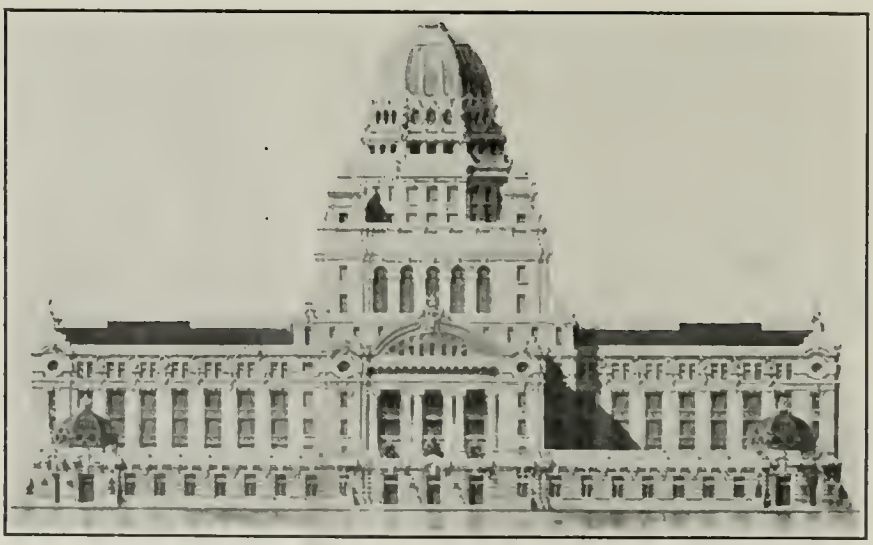
The basement which is two-thirds above ground will be utilized for senior student music, billiard and general recreation rooms. The heating and ventilating plant will be located here.

Eight large class rooms are on the main floor with all the modern conveniences and requirements of the best type of school house design and construction. On the second and third floors are living rooms devoted to the senior students whose class rooms are located below. These rooms are heated by steam, and are provided with running hot and cold water, individual closets,

One of the Completed Santa Clara University Buildings, Built of Reinforced Concrete. W. D. Shea, Architect

desk lights, and all other possible conveniences. A large shower room is provided on each floor for the accommodation of the senior students here located.

Plans are being completed for the remaining buildings of the group, including the junior hall, science building, power house, gymnasium, swimming tank, physical and chemical laboratories, church and other structures. When these buildings are completed, they will form a group of University buildings equal in design and construction to any of the most modern University buildings in the United States.



W. D. Shea's Competitive Design for the San Francisco City Hall

The Profession of Architecture

By JOHN C. AUSTIN,
President of Southern California Chapter A. I. A.

WHILE the profession of architecture is less understood by the public at large, it has more responsibility and receives less gratitude and remuneration than any other. It requires long and costly study, artistic and technical skill, good taste, and appreciation of color and knowledge of styles employed by the ancient, as well as the more modern practitioners. To be a successful architect one must, in addition to the requirements above stated, be a good business man, capable of conserving the interests of his client and yet being just to the contractor who is constructing a building from his drawings and under his supervision; in other words, he cannot act as an attorney for his client, but rather as an impartial judge. When a lawyer represents a client his work is seldom criticised, he is put on a pedestal and looked up to as a being of a higher order, and "win or lose," the client takes his medicine and pays the bill.

When a doctor has a patient he or she also takes the medicine without a murmur. If the patient lives, all right; and if it dies, why it is buried and there is an end of it. The mistakes of either lawyer or doctor are buried, the bill paid and the incident is closed, but the mistakes of an architect, either in construction or in good taste, will keep rising like Banquo's Ghost, to haunt him all his life, and after he is dead will stand out as a blot on his memory. Each profession has a great value, but the profession of architecture has a lasting influence on the civilization, health and morals of the nation. There is nothing that will tell what civilization was attained by races, that have gone more than architecture—scrolls, manuscripts and books have been destroyed, but the history showing the life, habits and religion of races that have entirely disappeared are plainly shown to us in stone and clay by the architects of old. The Aztec, the Hindo, Chaldean, Egyptian, Hebrew, Greek and Roman buildings all have their story to tell of war and science, as well as of peace and luxury. There are very few real architects, and the name of the men who designed many of the world's masterpieces are unknown. The Greeks had Ictinus; Italy, Michael Angelo; France, Viollet-le-Duc, and England, Sir Christopher Wren, each of whom left an indelible mark on the world's progress and set a standard for the men of more modern times to emulate. Before the best that is possible can be arrived at, the profession of architecture will have to be better understood by those who build.

An architect is not, as some think, a glorified contractor who makes pictures. Usually, he is a man of education, business ability and resource, who is called upon to solve large problems and adjust petty difficulties almost in the same breath. He is called upon to spend great sums of money in such a manner that it will bring a substantial return to the owner. He must design a building that will not make the neighbors curse the day of his birth, and he must embody all of the latest appliances for comfort that he knows of—and some that he doesn't.

Getting to local conditions. About eighteen years ago the Southern California Chapter of the American Institute of Architects was started, its object being to raise the standard of the work to be executed by those professing to be architects.

By comparing the work that was done at that time and now, it is easy to see what advance has been made. Nearly every charter member of the original chapter is practicing today and doing work that will bear criticism from practitioners of any city of equal size in America. New men have come to join the ranks and some have climbed the ladder pretty high, but the men who started with the original few are holding their own in the general advance.

The aims of the "Institute" are to encourage honest and straightforward business methods and to insist on ethical conduct by its members, and to establish a proper schedule of charges. The Institute has wrestled with a very vexed question: viz that of competitions, it has endeavored to formulate a code that would be fair both to the client and to the competitor. Wherever this code has been used the results have been fair to both sides. The United States Government practically adopted the Institute code when the "Tarsney Act" was passed, and since that time the standard of the government building, both as to plan and design, has advanced marvelously. Not many years back everyone who thought of building would call on half a dozen architects, try to get their ideas and sketches without any expense to themselves, and then employ whom they choose. Often their minds were made up as to who would do the work, but they were afraid to proceed without getting a collection of ideas from others for which they had no intention of paying. This system is changed now, mostly due to the Institute's work, and the general public has come to the logical conclusion of selecting the architect best fitted to carry out their scheme. An architect's time is of value as well as that of the lawyer, and sketches take time, thought and knowledge, as well as the preparation of a brief: yet one never finds a client asking half a dozen lawyers to prepare competitive briefs free of charge and then, after the briefs have been studied and ideas gleaned from each, to "reserve the right to reject any or all briefs" and to employ whatever lawyer they choose. The bar association would consider that kind of business unprofessional, and yet a few months back a very prominent lawyer severely criticised the Institute of Architects for refusing to countenance a competition along the lines outlined above. I feel that most of the ideas that I have expressed have been gone over time and time again at our Institute meetings, but they can never be repeated too often. Each architect should work for the educational and moral advancement of the profession and in doing so he can take this motto from Shakespeare, "To thine own self be true, it must follow then, as the night the day, thou canst not then be false to any man."

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New York's Greatest Hotel Building

The plans have just been filed with the Bureau of Buildings for the Borough of Manhattan for what will be, when completed, one of the largest hostelries in New York City, if not in the country. It will be known as the "Biltmore" and will occupy the entire block bounded by Madison and Vanderbilt Avenues, Forty-third and Forty-fourth Streets—the site formerly occupied by the offices of the New York Central Railroad.

The structure will be 25 stories in height, will have facades of brick, limestone, terra cotta and granite and will be fireproof throughout. Its foundations will extend over 12 sets of railroad tracks to be used by the railroad for its incoming suburban traffic and the lower part of the building will be the station for this service.

According to the architects, Warren & Wetmore, 3 East Thirty-third Street, New York City, the hotel will be 305 feet high and the cost will be $4,500,000.

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* *

Sick?

A Wichita, Kansas, child who had been absent from school brought back the following excuse when she returned: "Dear Teacher—Please excuse Jennie. She was sick and had to stay at home to do the washing and ironing."

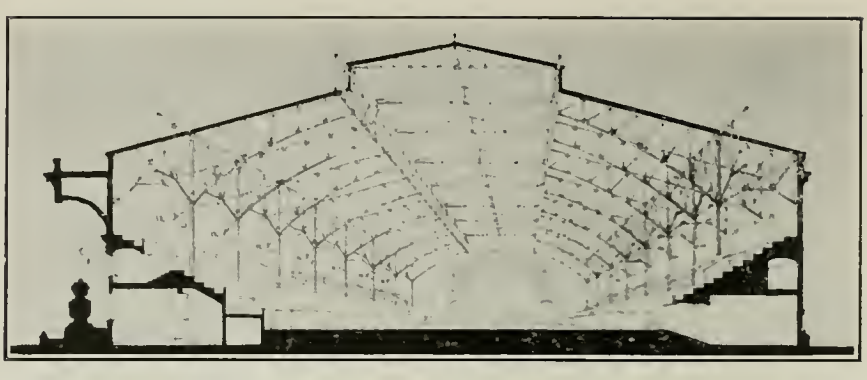
Perspective View of North Elevation, Oakland Auditorium
J. J. Donovan, Supervising Architect.

The Oakland Auditorium Scheme

SUPERVISING Architect J. J. Donovan of Oakland has submitted an attractive plan for that municipality's proposed auditorium, bonds for the construction of which were voted by the city some time ago. The Peralta Park Play Grounds have been selected as the most desirable site for the building, and in his report to the Public Works Commissioners, Donovan outlines the scheme as follows:

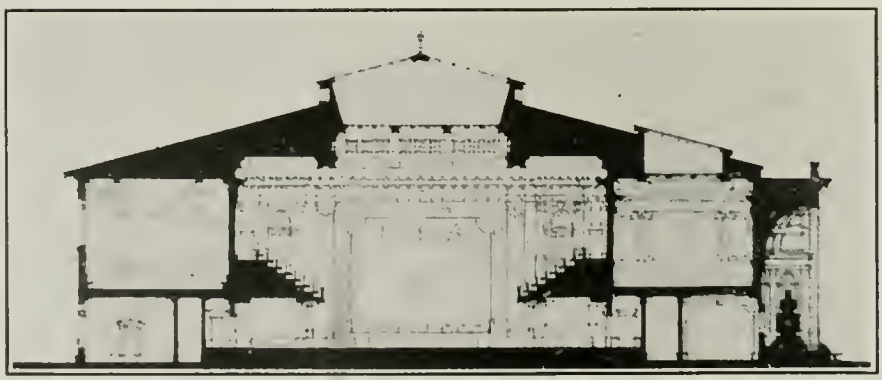
"In submitting these sketches an effort has been made to develop a civic center, showing the auditorium with a prospective future public library and a future art museum, forming a square, with a large plaza leading up to the auditorium which fronts on the lake. Also a treatment of the south side of Twelfth street and the shores of the lake by means of an esplanade and steps leading to the water, with small pavilions at the ends of the steps which may be used for casino and boat house purposes.

"The play ground space back of the auditorium covers an area of 500 feet by 1,200 feet, which gives ample room for a half-mile track which in turn encloses a quarter-mile track and which provides sufficient space for a large stadium. On the southeast corner of the play ground space is shown in outline a possible natatorium.

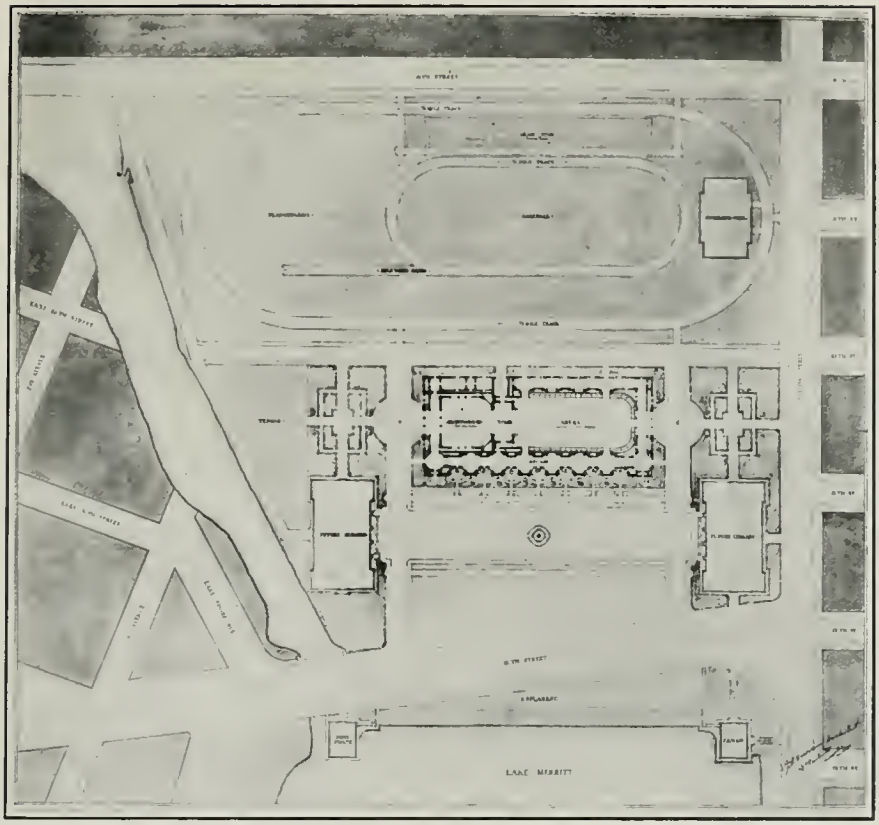


Section Through Arena, Oakland Auditorium

Elevation Oakland Auditorium



Section Oakland Auditorium



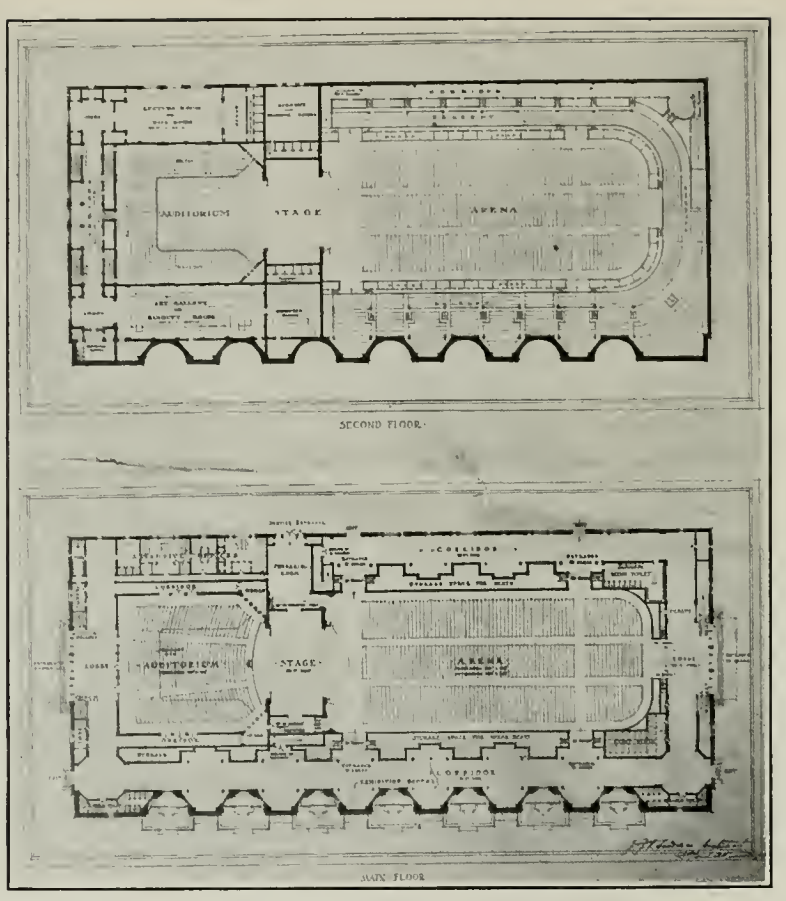
General Plan of Oakland Auditorium Showing Development of Civic Center

"The auditorium itself is 450 feet in length by 200 feet in width. The height at the center portion is 75 feet. The scheme is that of one large building which contains an arena over all dimensions of 180 feet in width by 265 feet in length; the arena floor area is 100 feet by 225 feet. This room will have a seating capacity of approximately 10,000 people, and to the west of the room is the stage which connects with another large room which we have styled the lecture hall or smaller auditorium, which is 100 feet by 100 feet, and which will have a seating capacity of 3,000 people, which when connected with the arena will give a total seating capacity of approximately 13,000 people exclusive of standing room.

"Separating the arena and auditorium is the stage, which as stated before, connects both and which may be lowered to the level of the floors. The two asbestos curtains divide the arena from the auditorium which permits the two rooms to be used separately or jointly.

"Surrounding these rooms is an ample corridor, with large lobbies for both. The portion of the corridor toward the north has been developed as a hall for exhibits, well lighted and containing booths or stalls for individual displays.

"On the second floor, flanking the auditorium, are two large rooms with their staircases and lobbies, with their services and these rooms may be used as Lecture rooms, art galleries, dance halls, banquet rooms, etc.



Floor Plans, Oakland Auditorium

"The building has been well provided with inclined plane for the arena, thereby doing away with awkward staircases. Executive offices, toilet and cloak room have been provided in view of the many uses of the building and a service entrance is shown at the rear of the building, leading to a large preparing room for scenery, dressing room, etc.

"The skylight roof over the arena can be rolled back on the cantilever trusses so as to give a ventilated and open-air room for the arena.

"As to the architecture of the building the facade fronting the Lake is the most important and this elevation has been developed so as to be most interesting and forming a dignified scheme for the rectangular structure in the back. This facade is constructed of a granite wall 420 feet in length by 55 feet in height, pierced with seven arches, 30 feet in diameter and these arches form the frame for niches; each of these niches have three windows which provide an abundance of light to the corridor and will be constructed of artificial stone. The niches will contain monuments and fountains, emblematic of the industries of the State of California, such as forestry, horticulture, agriculture, fisheries, mining and transportation.

"The illumination of these niches with concealed lights in the ring of the arch and lights behind the fountains will produce a festive appearance and fur-

thermore the entire structure is crowned by an illuminated cresting, which will silhouette itself like a piece of luminous lace against the dark sky at night.

"The interior of the building will be treated according to the character of the room. The arena will have concrete slopes, wooden floor, exposed ornamental roof trusses, panel walls. The auditorium, the two small rooms and corridor on the second floor will be treated in plaster ornamental and decorated.

"The conception has been to make the auditorium a most interesting building, unique in its plan, as well as in its elevation, so that it will prove an attractive monument for visitors coming to California as well as for the residents of Oakland.

"On account of the simple, straightforwardness of the design both of the exterior and interior, the estimated cost of the building is within the appropriation, namely, $500,000.

"The present project is to begin work on the final drawings immediately upon approval by the Council of these preliminary sketches and to carry this work on with progress and speed as good planning will permit. It is earnestly hoped that the city can let a contract for the piling and foundations by the latter part of August and a contract for the steel work almost the same time, and then a general contract not later than the middle of September."

* * *

Apartment Rents in Paris

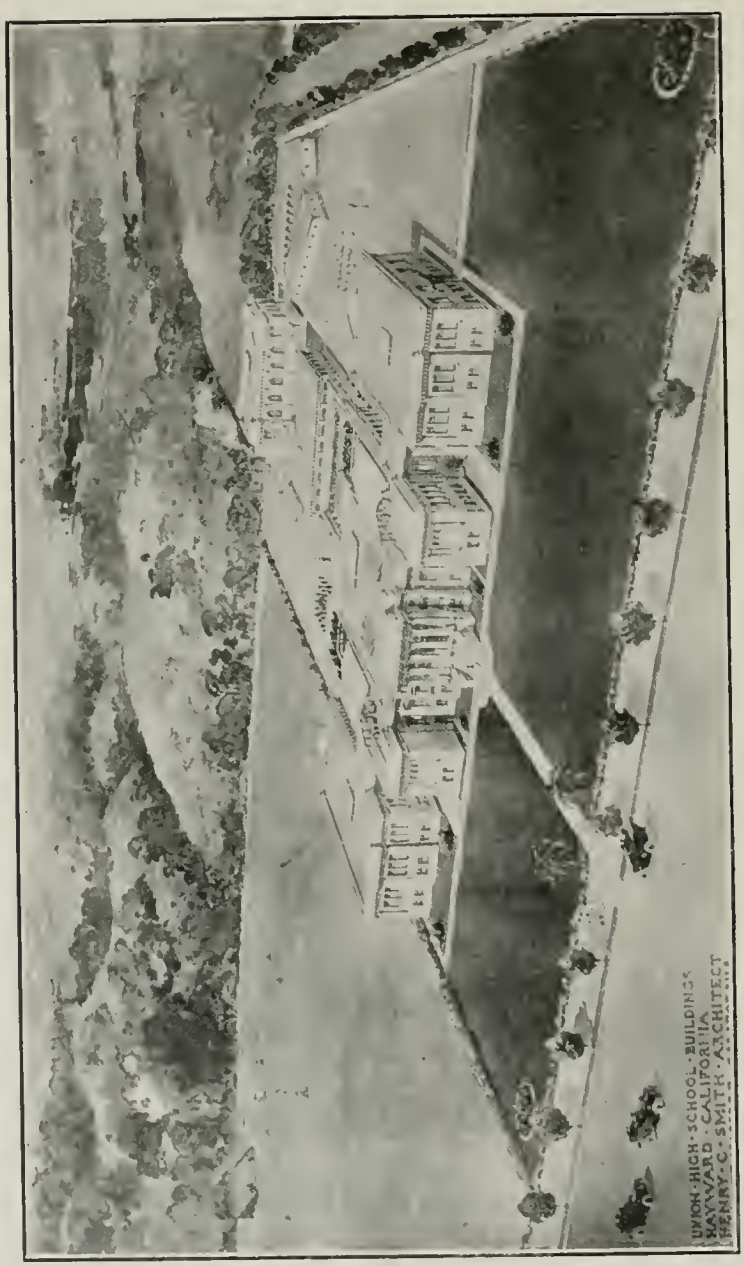
THERE are apartments in Paris (I mean "flats") rented for as much as $20,000 a year — which is close enough to New York's present limit of $22,000. They are, of course, in the Avenue des Champ Elysees, which means a good deal in terms of dollars and cents. A first-rate apartment, in a good part of Paris for Americans, with all of the American conveniences, can be had for from $1,000 to $3,000 per year. A fairly good flat, in the same superior quarter, can be had for $800, but it will face a courtyard only, and will be small and dark. These flats, renting at from $1,000 to $3,000, will be smaller than similar New York apartments in number of rooms. The rent will not include heat, light, telephone or constant elevator service. The servants' rooms will be detached in the distant, unchaperoned, and unheated attic. There will be no servants' bath, no mail-chute, no inter-communicating telephone and no adequate central heat.

The New Yorker pays, all other things being equal, no more for his housing than the Parisian does, while he has many more conveniences, and many more ways of reaching the city by the numerous transportation lines. Add to this the almost unlimited choice and range of prices possible in New York, and the balance is very much against the French. In Paris the apartment hunter must take what he can find or stay in the pension with the inquisitive spinsters. In New York he can pick and choose according to street and light and quarter and convenience—a dozen different landlords competing for his tenancy, and all within whatever limit he sets upon his rent appropriation. And this is why it is easier to be housed in New York with the all-round dignity which has regard not only to one's self, but to those one comes in contact with in life, than it is in Paris, all other things being equal.—James Edmund Dunning in Review of Reviews.

* * *

"When I was a young man I worked twelve hours a day," said the sire.

"I admire your youthful energy," replied the son, " but I admire still more the mature wisdom which led you to stop it."—Washington "Star."



The accompanying plate shows the architect's scheme for a group of five buildings for the Hayward, California, School District. All the structures will be of reinforced concrete and fireproof. Besides the main academy, or administration building, which is to be erected at once, there will be a manual training and science building, auditorium, gymnasium and power house. The buildings will occupy six acres, and the children's play ground and campus another six acres. The estimated cost of the entire group of structures is $200,000.

The Island Continent of the Pacific

By JAMES PEDDLE, F. I. A., N. S. W.*

CIRCUMSTANCES arising early this year under which I found myself able to leave my practice in Sydney, Australia, in competent hands for twelve months, I decided to devote that time to an unhurried tour through the United States.

America and Australia have many things in common; their people sprang from the same stock, speak the same language, hold similar ideals which they are trying to realize under conditions of self-government in advance of any the world has ever before known; both countries are richly endowed with natural wealth, and the climate of each has proved favorable to the highest mental and physical development of the race. There is, however, the important difference that, while the United States is in the full flush of vigorous maturity, Australia is a baby nation—just beginning—vaguely conscious of the future that may perhaps be.

America has peopled her country, in part with her own sturdy sons, and in part by levying tribute on the older nations of the world; cities, towns, villages, and innumerable centers of human activity, extend as links in an endless chain from border to border, from shore to shore. Australia's only populous centers are some short narrow strips forming part of her coast line and a few inland cities; for the rest, her people are grouped in small townships, on sheep stations or farms, in camps and in families, scattered sparsely over her vast territories.

America has by mining, agricultural, and manufacturing enterprises, drawn freely on her natural resources. She has wrested from the earth its hidden treasure, grown food in rich abundance, moulded crude materials into ten thousand varied forms to satisfy ever increasing demands, and spread over her millions of miles a network of railway to distribute these products to the very doors of her people. Although the production of wealth in proportion to the population is high in Australia, only the surface of the ground has been scratched here and there, just enough to indicate the almost limitless possibilities of the country, when population comes, thought and effort are applied to natural opportunities, and wise statesmen arise to direct her growth and control her destinies.

Because in many respects America is leading among the nations that have accomplished great things, while Australia is a country of hopes and expectations, and because so many of the problems that America has already solved better than any other people in the world are similar to those that Australia has to meet in the near future, the people of the island continent are looking northward across the broad Pacific for examples from which they hope to learn many useful lessons.

In nothing are the lessons America has to teach likely to prove of greater value than in the profession we practice for, in the next decade, the skillful planning and economical building of commercial structures will be of paramount importance; these results must be attained under conditions common to America and Australia, increasing wage rates and decreasing manual output, that compel the introduction and use of every method and device for increasing the effectiveness of labor. The purpose of my tour is to become familiar with American architecture and the various building methods in vogue here.

During the few weeks I have already spent on the Western Coast many inquiries made about Australia, particularly about my own city and State

*Written for The Architect and Engineer of California. At a recent meeting of San Francisco Chapter, A. I. A. Mr. Peddle gave an interesting description of his native city, speaking also of his American observations.

(Sydney, New South Wales), lead me to believe that a widespread interest exists here in what Australians are doing and thinking, and a few facts and opinions may be interesting to readers of The Architect and Engineer.

Record of the discovery of Australia by civilized man is lost in antiquity, but the Greek historian and geographer, Strabo, in his works compiled near the end of the last century B. C., makes reference to it. English exploration of the continent began in 1688. In 1769 Captain Cook visited it, and in 1770, by planting the British flag on Australian soil, made it the possession of a white race. Eighteen years later a settlement was formed at Port Jackson, where Sydney, the present capital of the mother State, now stands. In 1856 responsible government was instituted in New South Wales, and in 1901 the six Australian States, New South Wales, Victoria, Queensland, South Australia, Western Australia, and Tasmania, which until that time, existed as separate dependencies of Great Britain, united to form the Australian Commonwealth.

The area of Australia is similar to that of the United States, a little more than three million square miles. Extending as it does from the 10th to the 44th parallel of South latitude, the climate varies considerably in different parts. Although some of the Northern portions do not appear favorable to development by white labor and occupation by our race, over a very large area of the country most salubrious conditions prevail, similar in many respects to those for which California is renowned.

The principal products are wool, wheat, metals, meat, butter, coal, fruits, and timber; raw materials and food for which the demand is ever increasing and must continue to increase. The development of the pastoral and mining industries are the most advanced, and the world is indebted to Australia for a large measure of its supplies of gold, silver, copper, and wool. More than ninety million sheep were shorn last year, and nearly five hundred million pounds of wool was exported. Although wheat growing, dairy farming, and fruit cultivation, are comparatively new, they are a proved success, and each year larger areas of land are being devoted to these industries. Manufacturing has been stimulated by the protective policy of the Commonwealth government and Australia is, in many instances, turning her raw materials into finished products for the supply of her own domestic needs.

The government of Australia is strictly democratic. There are two Federal legislative bodies, the Senate and the House of Representatives, and two legislative bodies, the Legislative Council and the Legislative Assembly, in each State. The members of each Federal body are elected by secret ballot. Woman suffrage exists throughout the Commonwealth and every man and woman over twenty-one years of age has one vote. The leader of the party having the strongest support in parliament forms a Government, or Cabinet, by appointing from members of the legislative bodies, ministers to control the various government departments, with whom he desires to be associated, or whom he believes to be best fitted for the particular work. Provision is made for a dissolution and appeal to the Country prior to the expiration of the full parliamentary term, whenever a nearly equal division of parties makes legislative progress difficult, or there is sufficient reason to believe that the Government does not understand or correctly interpret the people's will.

Members of the State Assemblies are chosen by secret ballot under adult suffrage as at Federal elections, and State Cabinets are formed in the same way as Federal Cabinets, but the State Councils, following in part the Constitution of the English House of Lords, are nominee bodies, the members of which are appointed for life by the Governors of the several States. As, however, the appointments are made on the recommendation of the head of the Government at the time, the mentality of the Legislative Councils is indirectly controlled by the people.

For a number of years the general direction of legislation has been towards conditions and laws under which the country's wealth may be distributed as widely as possible among the people, with the result that, while there are few very rich men in Australia, the well-to-do are many, and necessitous poverty is almost unknown.

To encourage pioneer enterprise in the back country, some of the States offer large blocks of land, on long lease, at nominal rents, for cattle runs, to secure improvements and bring waste areas into use. As population spreads, large properties are divided into smaller ones, cattle runs give place to sheep stations, wool production to wheat growing, and wheat fields to dairy farms and orchards. Land laws provide for Government resumption, sub-division, and resale of large estates, where conditions favorable to closer settlement arise. In Government sub-divisions the conditions of sale are made as easy as possible; payment for the land is by installments extended over many years and very low rates of interest are charged, to meet the need of settlers with little capital, and assist them in every possible way towards success.

Irrigation has been tried in Australia for a number of years with encouraging results, and new projects for bringing increased areas under intense cultivation by this means are in various stages of development in several States. In New South Wales the construction of the Burrinjuck Dam will, when completed, supply water to three hundred and fifty thousand acres of exceedingly rich soil, with a backing of a million acres of non-irrigated land to be used in conjunction with it; at the present time between one-third and one-half of this is ready for use. As this is a State scheme, carried out by the Government for the national rewards represented by greater production and increased population, and not for profit, every inducement is offered to make settlement attractive, and the trustees will, when so desired, carry out such preliminary operations, including the erection of a house, as will enable the purchaser or lessee to at once commence the work of cultivation. Expert advice as to suitable crops and other agricultural matters, as well as the educational advantages of demonstration farms, are at the service of settlers. Stock is supplied, and implements from Government stores, at cost price. Butter, bacon-curing, fruit-canning, and other factories are to be erected, and cold storage accommodation provided, together with every facility for conveying produce to the ships' side for export, or to local markets, at a minimum of expense and trouble. The repayment of the cost of work done, and of stock and goods supplied, by the Government, may extend over a term of years, so that it can be made out of profits derived from the crops.

Much of the wheat is grown under a system of shares-farming; the land owner provides the land, the tenant the labor, and the crop is divided. By this system the land owner, having exercised care in the choice of his share-farmer, is relieved from all troubles connected with labor. The fact that the farmers' reward is more or less according to the skill or industry displayed, secures for the land owner the best service the man is able to give, and the largest return from his land; the farmer being an equal sharer of gross profits will spare no effort to make these profits as large as possible. That share-farming is satisfactory to the land owner is shown by the fact that every year the quantity of wheat grown under the system is increasing; that it is satisfactory to the farmer is shown by the number of men who, with farming experience and habits of industry, but little capital, have, by its means, been started on lines that in a few years led to independence. An example of such success, even where the farming experience was lacking, is the case of an ex-policeman who, with a capital of less than eight hundred dollars, commenced by share-farming two hundred and forty acres. In three and a half

years he had purchased a farm of his own, and his assets exceeded seven thousand eight hundred dollars.

Dairying is also successfully carried on under the shares system.

Public sentiment in Australia is in favor of the organization and conduct of public utilities by the National and State governments, or by Municipal or other public bodies, for the benefit of the people, and not by individuals or corporations for private profit. The postal services are rendered by a Federal Government department and this also controls the telegraphic and telephonic systems throughout the Commonwealth. All railways are State owned. The street car service in Sydney is State owned, and electric light and power is supplied by the Sydney Municipal Council. The supply of water and disposal of sewerage is controlled by a Board acting as trustee for the public, and harbors and wharves are largely held and managed by similar bodies.

Australia has been a country of legislative experiments. Some of these have proved so successful as to be copied by other nations, some are still undergoing the test of time, and some have proved defective and can scarcely remain permanently on the Statute Book.

Among the most interesting experiments are those attempting to regulate the relations between workmen and their employers. It has been enacted that industrial warfare shall cease; strikes by workman on the one hand, and lockouts by employers on the other, are offenses punishable by fine and imprisonment. Industrial Arbitration Courts are established to deal with disputes between employers and employees, and awards have been made legally fixing a minimum wage, working hours, and general conditions, governing nearly every form of employment. The minimum wage rates are generally high considering the purchasing power of money in Australia, and one effect of this raising of wage rates has been to stimulate inventive effort to the end that, by the use of improved tools and mechanical appliances, labor may be made more and more effective.

Under a special law six o'clock in the evening is fixed for the closing of retail stores and a weekly half-holiday is compulsory. In Sydney Saturday is fixed for this half-holiday, and every employee has one and a half days' consecutively in each week for rest and recreation.

A State Local Government Act passed in New South Wales a few years ago provided for the levying of Municipal rates in one of several ways, leaving the choice to each Municipality; among the methods provided was that of unimproved land value taxation, and this has been adopted almost without exception.

The aged poor and permanently incapacitated are provided for; both classes receive pensions, the former upon reaching the age of sixty-five, and the latter when the necessity arises.

All saloons close at eleven o'clock at night, and no liquor may be sold on Sundays. The law provides for local option, and the issue of licenses is controlled by the expressed wish of the residents in each district; under this control the liquor trade is gradually losing many of its old-time privileges.

Education is free, non-sectarian, and compulsory. Every child between the ages of five and fourteen must attend school unless proof is afforded that satisfactory private instruction is being given. The great difficulty necessarily experienced in providing for the children of parents living in the thinly populated country districts is met by establishing centralized schools, and conveying the children from and to their homes. The success of the methods designed to bring education to every child is shown by the extremely low percentage of illiteracy existing in Australia.

Besides general public schools the more closely settled centers are provided with Secondary Schools and Technical Colleges. Agricultural Colleges and

Experimental Farms are established in various parts of the country and graduates from these bring to the problems of primary production scientific knowledge as well as practical experience.

There are several Universities in Australia all the privileges of which are open to women as well as men. The degrees conferred rank equally with those of British Universities.

A Defense Act, recently passed after much controversy, enforces military training throughout the Commonwealth, and from the time when the rising generation reach maturity every man in Australia will be a trained soldier.

As architects we have no professional interest in any country passing through its first stage of development. Pioneers of civilization, blazing a trail through the primeval forest, have no money to spare for the erection of costly structures, nor time, nor thought to appreciate and enjoy them. The simplest shelters they can build themselves from materials ready to hand at the place in which they happen to be, serve for homes, and meet all the needs of which they are conscious, until the first sharp battle with untamed nature is over. Later, when wealth is won and easier conditions appear, new physical needs assert themselves; a desire for comforts and conveniences not dreamed of in the old hard days, and still vague and uncertain in its form, claims to be satisfied, and the occasion arises for the specialization of work under which those naturally qualified devote their time and thought to the best way of providing for these needs, and are able to render expert advice and help. Later again, as leisure permits, the broadening effects of reading and travel, of association with other thoughts, other minds, develops individual aesthetic and intellectual needs, and as communities are formed and men and women associate in groups for mutual benefit, civic and national, aesthetic and intellectual needs arise, and opportunities for the architects' services increase and multiply. New responsibilities are created with each advancing step, and men possessing skill and culture coupled with the highest ethical ideals are wanted to carry these responsibilities and discharge the obligations such conditions bring.

Australia, in her development, is passing through these conditions, and happy indeed will she be if we whose privilege it is to direct the building of her homes and cities, are found humble in our willingness to learn from whoever have lessons to teach, alert to perceive the new needs of a new people, broad and unselfish in our relations to each other, scrupulously honorable in the discharge of our obligations to the clients whom we serve and, equally, to those who submit themselves to our control and jurisdiction, faithful to every detail of our trust; then shall we build with a substance more enduring than stone, and win for the profession we love that high place, which is its right, in the esteem of the nation and the world.

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Architects and the Buildings They are Designing

LEADING Exposition architects and sculptors, members of the architectural commission of the Panama-Pacific International Exposition, held their second meeting in San Francisco, the middle of this month, designs prepared by the various members of the commission were submitted and discussed.

Tentative plans were presented by the following well known architects, and with certain changes agreed upon, they will be finished without further delay:

Main central court McKim, Mead & White; main central dominent tower, Carrere & Hastings; west court, Henry Bacon; horticulture building, Bakewell & Brown; festival hall, Robert Farquhar; machinery building, Geo. W. Kelham; main facade of the entire group of buildings, Bliss & Faville, and north and south gardens and general plan, Edward H. Bennett.

Montgomery Hotel, San Jose, William Binder, Architect, Z. O. Field, Contractor

Interior of Moffitt Residence, Oakland, Willis Polk & Co., Architects

Pilgrim Congregational Church, Pomona, Cal., Robert H. Orr, Architect
Ferdinand Davis, Associate

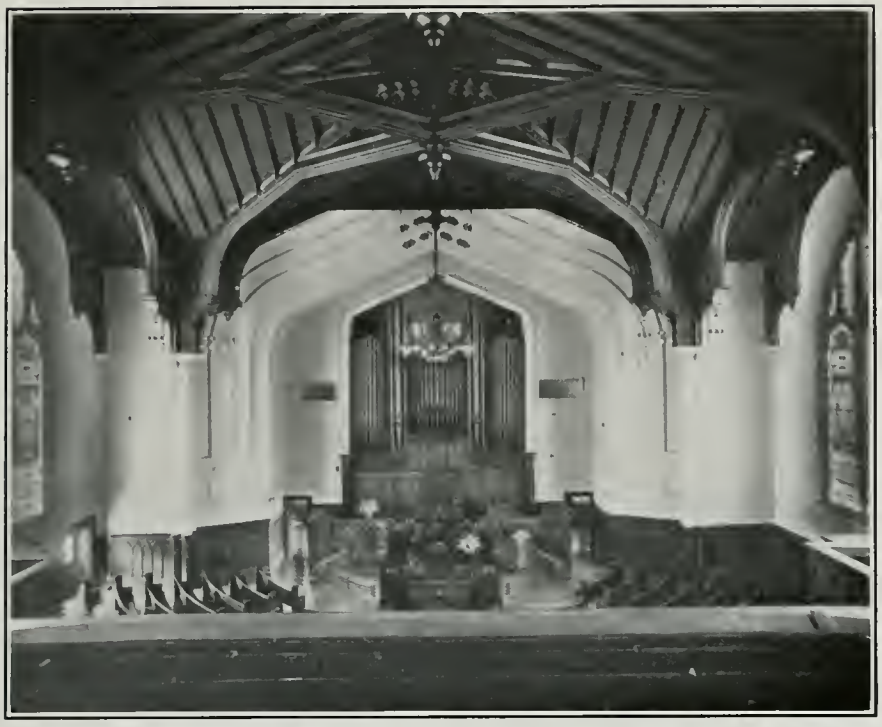
The Pilgrim Church at Pomona, California

ON the 26th day of last May, the Pilgrim Congregational Church of Pomona dedicated their new place of worship, thus completing the greatest church building enterprise ever undertaken in the City of Pomona and one that has been marked with much favorable comment and interest not only by the citizens of that town, but of the entire Southland. Few cities can boast of better churches than are found in Pomona, but this, unique in its plan, meets the needs in a practical way of a large and progressive church body. In casting about for plans for a building, the committee had a vision in the possibilities of a semi-institutional church. The planning was carefully weighed and studied and about one year was spent before the architects had the working drawings sufficiently completed to call for bids. On the first day of the year 1911 ground was broken and work begun in earnest.

The general arrangements is a church building of cruciform plan and a Sunday School chapel, which has been named Pilgrim House, connected by a cloister in front and the primary and beginners' auditorium with their class rooms in the rear, thus surrounding a spacious court. The church is 80 by 120 feet in dimensions. The ceiling, 45 feet high, has beautifully decorated beams and plaster ribs. The floor is sloping and within the transept is bowled, thus giving straight and amphitheatrical seating. The wood finish is white oak, quarter sawed, a rich golden oak color with pews and organ case to match.

The main entrance is through a massive portal surmounted by a tower 24 feet square and ninety feet high above the curb. A cloister entrance with incline floor leads in from the south off Pasadena street, and with the cloister connection to the Sunday School building gives access to the stair halls flank-

Interior Pilgrim Congregational Church, Pomona, California
Robert H. Orr, Architect, Ferdinand Davis, Associate



Organ and Pulpit, Pilgrim Congregational Church, Pomona, California

ing the tower and leading to the gallery. Over the main entrance is a committee room.

The windows are ornamented with tracery, the memorial windows being 20x28 feet in each end of transept and are a work of art. In the rear, with separate entrance, are the choir rooms and pastor's study.

The extreme frontage of the two buildings is 236 feet, the extreme depth 128 feet.

Both buildings are thoroughly lighted, heated and ventilated. The roof is of slate and the exterior walls are of brown brick laid in black mortar with raked joints.

The style of architecture is the Early English of the 12th century, free from the massiveness of the Norman style which preceded it, is magnificent and rich, strong in its dependency upon proportion, with a well defined outline marked by greater simplicity in decoration than the decorative period that followed. It is a land mark to Pomona, a monument to its people, and an achievement in architecture worthy of mention.

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High Cost of Living

The contention of Dr. Warne in his article on "The Cost of Living," that the prevailing high prices of the necessaries of life are owing largely to trusts and combinations of capital, finds support in the recent testimony of the President of the American Warehousemens' Association that about $28,000,000 of eggs and an approximate quantity of butter had been held in cold storage through the autumn and early winter in order to get higher prices.

Architectural Contractors

By CHARLES E. WHITE, Jr.
(In Building Progress)

ABOUT eight years ago in the suburbs of a large city, a firm of contractors started up. The firm consisted of a man about fifty-five years of age, his partner and his partner's son. The latter, a young man about eighteen years old, had been through high school, where he completed a short course in drawing. He knew how to manage T square, triangle and inking pen. He was familiar with the architect's scale, and being fairly conversant with working drawings (which he had seen on his father's jobs) he was able to draught out floor plans.

After a few weeks a new house was started on one of the principal streets and in a short time nailed to the front walls of the building a sign appeared, reading something like this:

DESIGNED AND BUILT
BY
TIMOTHY AND JONES
ARCHITECTURAL CONTRACTORS

Pretty soon the new firm was very much talked about. "It is so handy to have a house designed and built by one firm," Mrs. Walworth, the owner of the new house said to her friends. "You save the fee of an architect and avoid the annoyance of dealing with one. Why, actually," she said, enthusiastically, "I can have everything just as I want it; there is no one to fight with, and Timothy & Jones do everything I tell them to."

Week by week the structure grew until it began to take on the appearance of a finished building. Then passers-by noticed some of the peculiarities of plan with which it was afflicted. A porch appeared on the front, rather too narrow for comfort. A day or two later some more porch was added to it, extending around the corner. Then, after a week or two, part of the last piece of porch was taken off again. Things seemed to be going haphazard. What was built one day was frequently torn down the next, and Mrs. Walworth, with an anxious eye, spent most of her time on the job. The contractors were eager to please her, but she didn't know what she wanted and they couldn't guess, so things went from bad to worse and everybody on the job was sore, from the owner down to the hod carriers.

Well, finally, the house was finished and it didn't make a hit with anyone, not even its owner. Most of the people in that town were well educated. They had seen so many good houses that they did not enjoy the vulgar, ostentatious look of Mrs. Walworth's. Those women who lived in new houses designed by architects were quick to appreciate the points of superiority of their own over the Walworth house. They could see how much better their houses were planned—how much prettier they looked.

Timothy & Jones flourished for a time. Several more houses were built by them — pretty much on the order of freaks, every one. Then business dropped off. Times were hard and they found it necessary to go into the regular bidding game in competition with other contractors.

Timothy began to call upon architects to solicit business. "What architects have you worked for?" an architect would say, and Timothy was obliged to acknowledge he had never built for architects; his work was designing and building houses for owners. "Oh, yes," the architect would reply; "well, there isn't anything to figure on just now. When something turns up we will let you know."

The town grew and houses were built in larger numbers, but somehow Timothy & Jones rarely got any business. Nothing seemed to "turn up." All the more profitable jobs were designed by architects, and architects invariably

passed over Timothy & Jones when they distributed their plans for bids. Timothy ran his legs off to get work, but work didn't come.

Finally, he got up against an architect who, practicing for years, had designed hundreds of houses in all parts of the country— a straightforward, cold, blunt business man, one of those big fellows who strike straight out from the shoulder and have about as much sentiment as so many tons of trip-hammer.

"You needn't come here whining for a job," said he to Timothy. "You can't play both sides of this game, posing as architect and contractor, chasing after owners, trying to take legitimate house designing away from architects, and then when you don't succeed coming in here to beg for work." He went on: "You had better understand right now that the average contractor knows no more about house planning than I do about railroad engineering. Nine times out of ten when a contractor makes plans for a house he is perpetrating a nuisance upon the community. This is where you get off— and you needn't come around any more."

In small towns where there are no architects it may be wise for a contractor to go into the plan-making business. In communities where there are architects, however, contractors had better stick to their knitting and let plan-making alone. They will find quite enough to do to direct the work, for the average workman, though he may be efficient when properly handled, is a proposition demanding great care and skill on the part of his boss.

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Beauty as an Asset

WE Americans are gradually coming to recognize a positive asset—a prosaic monetary profit—in an architecturally beautiful structure. Europe long ago learned this lesson; we have yet very much to learn. In all large cities of the Continent one is not permitted to erect a building which will prove a disfigurement to surrounding structures, or to the symmetry of the street on which it fronts. Thirty years ago our commercial buildings were put up with a view chiefly to secure a certain amount of space protected from the weather. This was the period of flimsy construction, bare utilities, resulting in buildings that were dangerous fire traps, and which frequently tumbled down from overloading. The next step toward more substantial structures, better light and sanitation. Yet when an owner planned, say, a $100,000 factory, he regarded the architect's plea for an extra $5,000 for interior and exterior decoration as absurd and impossible. He refused to entertain the idea. The building must cost the least possible amount computable with the law. And yet the interest at 6 per cent on the amount represented by the difference between an actually hideous front and one permanently pleasing and ennobling was only $300 a year.

We have left too much to the engineer, and sought too little from the architect. Hundreds of bridges may be seen in our large cities which have been built with the one aim to sustain a certain number of tons at one time. A bridge should be a thing of beauty, yet how seldom do we see in this country a beautiful bridge. In Europe, for years past, the architects have built the bridges, beautiful bridges, as they did the cathedrals which Americans travel thousands of miles to see.—Popular Mechanics.

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"It is very provoking that your wife should have read my last letter to you. I thought you said she never opened your letters?"

"But you marked it 'Private.' "

Instructions to Juries in Architectural Competitions

[Anent the recent San Francisco City Hall Competition a subscriber requests that we print the following editorial which appeared in the New York Architect last May]:

THE first competition for the traveling scholarship founded by Mr. Pierre Le Brun will close on May 15th; the program contains some interesting provisions. It is undeniable that the weak point in the majority of our competitions is the juries—or rather, the way they do their work; too often competitors have had just cause for complaint that the jury has not taken sufficient time for a study of the program, let alone a thorough examination of the drawings and judicial weighing of their relative merits; while an inspection of the site and the other physical conditions is the exception rather than the rule. Usually busy men, they too frequently hurry through and attempt or pretend to judge in a few hours of one day the work of men who have given weeks of study to the problem.

Although this competition is in a sense academic, the committee in charge has, for the first time within our knowledge, included in the program, instructions to the jury and "agrees with the competitors that the jury will examine the drawings on at least two successive days, and that they will use their best efforts to secure a due and proper consideration of the efforts of each individual competitor and a deliberate and careful judgment." The instructions to the jury are as follows:

1. Examine carefully the program, the data provided therewith for the use of competitors, and the site, prior to the examination of the drawings.

2. Examine carefully each design to determine whether all the provisions of the program are complied with.

3. Place hors-concours any design which does not comply in every particular with the program.

4. Sit on at least two successive days and devote a reasonable length of time on each day to the examination of the drawings.

5. Render a written report to the Executive Committee, setting forth the reasons for the award of the Scholarship, and of at least three honorable mentions in their order.

6. Only those who are willing to discharge this duty to the profession as stipulated herein and give thoughtful and careful consideration to the efforts of men who have spent anxious weeks upon their drawings, should accept the appointment as jurors.

This is a long step in advance and such clauses should form a part of every competition program.

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Competitions as Viewed by one Architect

THE late E. P. Overmire, who was a successful practicing architect in Minneapolis for a number of years, is the author of the following article on "Competitions." Mr. Overmire's views are temperate and well considered, and are of particular interest to San Francisco architects at this time:

The average competition of today is looked upon largely as a necessary evil, to be avoided by the best class of architects, except under most rigid restrictions and an assurance of fair play to all concerned.

There is no better method to develop and enlarge a man's individuality than a well conducted competition, but, unfortunately, the majority of men after a few experiences wherein real merit is set aside and merely personal preferences or influence shapes the result, prefer to abstain rather than indulge their natural propensities, with the result that the competitors are too fre-

quently reduced to the less capable and less scrupulous of our brother architects.

The embryonic architect finds in competitions a fine opportunity to test his wings; it really assists him to reduce his theories to practice, but he, too, is apt to tire of indulgence in large undertakings, where only a vulgar "pull" with some one in temporary power can assure him of anything like fair competition. The experience gained, both in designing on a large scale and in the mode of handling such enterprises, are well worth, to a beginner, the outlay of time and money involved.

In days of old such men as Michael Angelo, Bramante and Brunelleschi, did not hesitate to enter the lists, where the pecuniary rewards were much less than men expect today; but it is presumable that actual merit prevailed then, rather than any mere personal influence, not backed up by the real merit.

Our noble capitol at Washington was the subject of competition, and the awarding of the prize to Thornton was no error. George Washington made few errors, as a rule, and he certainly made none in deciding upon Thornton's design as the best among those submitted for this important building.

Apparently these men served for the love and glory of their profession, rather than for mere pecuniary reward.

Today conditions are reversed, the result of the average competition being decided too frequently by the amount of influence the aspirant can bring to bear. This fact restrains honest, self-respecting men from entering into a "free-for-all" scramble, knowing beforehand that merit will probably have but little influence, and that ability to handle committees or commissioners will determine the issue, which all honest men deplore and abhor. Well may honest men blush for the lack of character shown, or required, to win in the average competition of today.

Now, building committees should not be blamed altogether for this deplorable state of affairs; for the architects themselves are much at fault. If there were not vulnerable men on the competing side, there could be none on the other. If it were generally understood that nothing but absolute honesty would be tolerated, and if it were undertsood that any attempt at bribery or crookedness would instantly bar one from further consideration, or if men would refuse to compete under manifestly unfair and dishonest conditions, these committees would be compelled to conduct competitions in a more honorable manner. The remedy lies in the hands of the architects, and it is that they be honorable among themselves.

The ideal competition should have, first of all, a committee of strictly honest, capable men, familiar with the conditions required, and intent only on securing the best possible solution of the problem in hand. This committee should have an expert assistant, who should be an able and wholly disinterested architect, whose capacity should be that of adviser and interpreter. The requirements and terms of the competition should be set forth in a comprehensive and straightforward manner, giving all possible light as to requirements and conditions, and any details that would tend to an intelligent solution of the problem. The terms of this circular of instructions should be enforced to the letter, and the authors of the several designs should not be known, thus insuring the competitors "a fair field and no favors."

Assisted by the unbiased judgment of the expert (his position being that of an advisor), the committee should then decide as to which of the competitors has met and solved the given problem in the most intelligent and comprehensive manner and they should render judgment accordingly, bearing in mind that the opinion of the expert is entitled to something more than mere consideration.

As evidence that eminently fair and satisfactory competitions are not unknown today, we may mention those held for the cathedral of St. John the Divine, in New York; the state capitol, at Olympia, Washington; the Milwaukee public library; the Baltimore court house; the New York public library; the New York city hall; the Phoebe Hearst memorial, etc. Where a man of Peabody or Professor Ware's standing and ability is employed as expert, all parties can feel assured of fair and impartial treatment.

Upon the decision of the committee or board, the prize having been awarded to the one who has handled the problem in the most satisfactory manner, the work of designing and superintending should also be awarded to him at the regular rates for such services, as established by professional ethics, this being the reward for a successful solution of the problem. Where second, third and fourth prizes are offered, they should be of sufficient size to recompense one for his time and outlay in the preparation of his design.

A close competition is generally more satisfactory to all parties than an open, free-for-all one, which results in the submission of designs by many incompetent and irresponsible parties. In a close competition, only a select few are invited, each being paid a fair fee for his sketch, and the one most nearly meeting the ideas of the committee is chosen to carry out the work.

In the judgment of the writer, and in that of leading members of the profession, the best method for securing plans for a building of importance is to select a man, eminently capable and honest, then entrust the work to his hands without any annoying hindrances or impediments, holding him responsible for satisfactory results, and paying him well for his work, so that he can feel free to give it his undivided time and attention, thereby making it a monument to his skill, industry and honesty, as well as to the good judgment and probity of the committee or board.

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Architect Versus Client

THERE are several rules affecting their relations which might profitably be observed:

1. An architect's time is of value and must be divided with precision. Material men and others soliciting favors should not, therefore, object to the observance of a definite hour for their interviews.

2. Clients should, also, call by appointment and not feel that an architect's time is all their own or his studio a club or lounging room simply because they have commissioned him to draw a set of plans.

3. Clients should take up all matters affecting changes in their plans with the architect and not with his draftsmen.

4. Contractors should not expect the architect to issue certificates in excess of work performed or overlook defects and poor workmanship, simply because the former is "hard up" or was deceived by the material man or imposed upon by the sub-contractor. The architect is looked to by the client to protect his interests at all hazards and to "cut out favoritism" of all kinds.

5. Clients should make timely provision to meet all certificates as issued with the same regularity and promptness that a bank would pay a check.

6. New contractors should not expect to be received with open arms. There is so much responsibility and risk involved in handing over construction work to an unknown contractor that the architect is justified in using the greatest caution in adding to his list and may reasonably ask to "be shown" before accepting the services of the newcomer.

7. Don't believe that an architect is a "grafter," else you will "make a bad break" by insinuations that there's "something in it for him" or that "he will be taken care of." Assume he is honest and you will make few mistakes.

A Good Roof is as Essential as a Good Foundation

By HARRY LARKIN*

A ROOF covering is the prime reason for your building houses. It has become the universal custom for human beings to seek shelter of some kind, winter and summer from the elements, therefore a roof is necessary; otherwise a stockade or corral would be sufficient to protect our goods and chattels. The details of ornamentation, such as columns, cornices, etc., are simply to please the eye. The windows and chimneys are only to add to our comfort in occupying the house. But the roof is the all important feature, which as I have stated, is the prime cause for the house being built at all. Therefore the roof covering is a feature of architecture which should command careful attention and is deserving of much thought and study.

Many different characters of material have been used for roofing, but asphaltum is the base of that particular character of roofing I have devoted considerable study to and which I consider the most serviceable and adapted to the widest use. Asphaltum of itself is a peculiar substance which is little known, in fact has been so little studied that few realize its many valuable qualities. I have often compared it with hydraulic cements which were known centuries ago, but it is only within the past decade that extended use has been made of them.

Asphaltum, like cement is simply a binder and must be used in conjunction with other materials to serve our purpose. In building the customary roof, it is used in its softer form to saturate felt or other materials to serve as a body material. This body material may be laid out on the roof surface, cemented together with hot asphaltum and in turn given a top coating for weather protection, into which the usual practice is to imbed gravel to serve as a fire protection and retard oxidation.

Of all characters of roof coverings, the most serviceable, and the one given the lowest insurance rating by the National Board of Fire Underwriters, is one composed of at least five layers of saturated roofing felt cemented together with asphaltum and covered with I inch flat tile bedded in cement. "These roofs," to quote from the report of the National Fire Underwriters, "afford a very high degree of fire protection to the roof structure; which are not readily flammable; which do not carry or communicate fire; which do not give off flammable vapors or gases in large volume when exposed to high temperatures; which possess no flying brand hazard; which possess considerable blanketing effect upon fires within the building; and which are durable and require repairs or renewals only at infrequent intervals."

There is no other character of roof covering considered in the same class with this. A well laid five-ply felt and gravel roof and tin roofing when laid in a specified manner over a sheet of 16-pound asbestos are the only ones considered under Class B, the next lower rating. Natural slate comes under Class D. Prepared ready roofings rank in classes E and F and wood shingles are referred to as "a menace to property, and have repeatedly demonstrated their hazardous nature as conflagration breeders."

The ordinary five-ply felt and gravel roof as called for within the Fire Limits by our Local Building Laws, if laid conscientiously, is good enough for any building, and is also cheap enough for any building. When I say "laid conscientiously," I will state that the laying of felt and gravel

*Extracts of a paper read before the San Francisco Architectural Club.

roofing is an art that may be skinned under the direct supervision of an inspector unless he be thoroughly conversant with the business. I believe there is no part of building construction, unless it be painting, where the integrity of the contractor is such a feature as in asphalt roofing. I have had architects complain to me of the poor service given by felt and gravel roofs they have specified and it is a difficult matter to make them understand how all roofs are not alike when composed of asphalt, felt and gravel. As an illustration, I met a man some months ago named Cordes, who owns a building at the northwest corner of Sanchez and Eighteenth which I roofed in 1896. He said his roof on the building had never been touched since it was put on 16 years ago, but a building adjoining on Sanchez street which he had built since the fire was in need of re-coating and repair. The two roofs were probably made of the same materials but there was probably not half the asphaltum used in the latter roof as in the first, and I doubt if as careful workmanship displayed. On the straight-away portions of a roof only reasonable intelligence is necessary, but at the pipes, flashings, corners and outlets is where the skill and judgment are required. I want to state right here that I feel that mechanics in my line of business are not given the credit that is their due. It is not a clean business, but one where constant judgment and care must be used in every movement. To my mind a felt and gravel roofer is a more skilled mechanic than the brick mason or the cement finisher, and I believe he is deserving of the high rate of wages he commands. To analyze the different branches of the business, let us look at the man who attends the kettle. In the first place it is the simplest thing in the world for the kettle man to ruin the asphaltum he is melting by overheating it. Burned asphaltum has lost its consistency and binding properties and will soon deteriorate. Another thing, all the other men on the job are dependent upon his furnishing a continuous supply of asphaltum melted to the proper point to keep them busy. You can readily see why we pay a kettleman full journeyman's wages and value him as highly as any mechanic in the crew. The man that spreads the asphaltum must be skilled in handling the mop so as to get a uniform coating both in laying felt and gravelling in. He must be active in order to get his coating down without delaying the felt, and must have a good eye not to leave any holidays in spreading the top coat for the gravel. The two men handling the felt must be skilled in getting it in proper place when laid down, for once down it can not be moved on account of the hot asphaltum it is bedded in. It is up to the felt men to make the flashings and corners in a manner that will make the roof tight, so altogether you see the full crew must consist of skilled mechanics. The high wages have attracted many men to the craft that will never make good roofers the longest day they live, but the more skilled men find constant employment among the various firms in that line of contracting.

With regard to materials on the market, I will state there is little choice between the various brands of roofing felt as it costs as much to make poor felt as good felt and competition compels the manufacturers to turn out a nearly uniform standard of material. Of course there are different weights of felt and for roofing work, it is poor economy to use anything lighter than 14 pounds, which is required by our local Building Laws. The unsaturated dry sheet required by the Building Laws within the fire limits may be what is known as risin sized building paper or light deadening felt. There is no particular reason for its being heavy and it would not be economical for the roofer to use very light material on account of its tearing too readily on an exposed roof. The object of this unsaturated dry sheet is to prevent the dripping of any excess of asphaltum where

wood sheathing is used and no ceiling below. This dripping has caused considerable damage in places where goods were stored in loft buildings. The unsaturated dry sheet lengthens the life of the roof greatly by keeping it from sticking to the sheathing boards. Where a roof is fast to the boards below it, every vibration of the building and every person walking over the roof throws a strain on the roofing felt that in time will result in its cracking at the joints and in turn will cause leaks.

The gravel used on the surface of a roof should be clean and uniformly screened, more particularly to get rid of the sand and dust, for in spreading the gravel if there be sand or dust in it, the fine stuff reaches the hot asphaltum first, and forming a skim coat, prevents the heavier gravel from being properly imbedded in it. Of course fine gravel or sand will go a greater distance to the load than heavy gravel and as a consequence some roofing contractors will use it for economy.

The most important item in roofing is the asphaltum. It is the "hot stuff" that makes the roof. The greater quantity of asphaltum used, up to a certain limit of course, the better job of roofing you will get. And the application of an ample top coating in a great measure governs the life and service you will get. It is the top coating that gets all the wear and exposure and a double coating of asphaltum and gravel on the ordinary felt roof will more than quadruple its life. The asphaltum industry is not sufficiently advanced as yet for the grades of material to be established. There is a vast difference in the qualities put on the market by different refineries. As a general rule I have found the best grades of asphaltum are from refineries using low gravity oil, as in its refining the oil is not treated at such a high temperature and is not so long in the process. This is a material in which you must depend upon the integrity of the contractor for it would take an expert to judge as to whether the asphaltum going onto the job was best suited for it. An unfortunate feature of the roofing business is that as a general rule it is done as a sub-contract, and as a consequence, the cheapest man usually gets the job. If the general contractor were made a party to the guarantee he would be more careful as to whom he employed for laying his roofs. In the mind of a client, nothing reflects so on the architect and builder as a leaky roof and it is surprising that so little care is given in selection of the roofer.

In the drawing up of specifications for a roof there are few jobs where a better roof covering will be needed than prescribed by our local Building Laws. The present law is the most sane and reasonable law ever on the statutes during my roofing experience. It permits a four-ply felt and gravel roof in that portion of the fireproof roofing limits taken up largely by residences and flats and where it is sometimes necessary to cut down every item of expense. Within the fire limits the law prescribes that the four layers of roofing felt shall be placed over an unsaturated sheet where wood sheathing is used. This makes a five-ply roof and at the same time prevents dripping of asphaltum as before mentioned. If an architect simply states in his specifications that the local building laws be complied with he will get a good roof if the law is lived up to.

Where tile is used as a roof, it is advisable to lay either two or three plies of felt under them to insure the roof's being tight. This is as cheap as any character of ready roofing can be laid and much more effective. In Southern California a character of asphalt roofing has come into use of late on bungalows that really gives them a very artistic appearance. It consists of two layers of saturated felt mopped together with a capsheet of ready roofing cemented to the surface with edges butted. Some of these ready roofings are finished with a white sand that gives the finished roof a neat and

clean appearance. Such roofing costs much less than a gravel covered roof and would be well adapted for use on the temporary buildings and concessions at our coming Exposition. Asphaltum roofing can be adapted to almost unlimited conditions whether it be low cost, artistic appearance, or service that is wanted.

*
* *

Judgment Rendered to Architect for Services in Action on Contract

A CASE of particular interest to Pacific Coast architects was decided recently by Judge Cassidy in the Los Angeles Justice Court, the court handing down a ruling upon a question so far not covered by any law of the State.

The case was that of Architect H. Alban Reeves, plaintiff, against Geo. J. Cote, owner and defendant. The following brief outline of the case and the ruling was prepared and is reprinted from the Southwest Contractor by Duggan & Wisdom, the attorneys for Mr. Reeves:

On August 18, 1911, defendant employed plaintiff, a licensed architect, to prepare plans, i. e., working drawings and specifications for a two-story dwelling, 40x45 feet dimensions, agreeing to pay said plaintiff for said services a sum equal to three-fifths of six per cent of the cost thereof, without superintendence of architect, it being the intention of defendant to superintend the construction himself. Defendant at this interview stated that he desired to put about $5000 to $6000 in the house, exclusive of foundations.

Plans were prepared by plaintiff under supervision and instruction of defendant and defendant's wife. Complete working drawings and specifications were delivered by plaintiff to defendant on October 24, 1911, after many delays occasioned by changes in plans made by defendant and wife. Plaintiff then submitted bill for services, based upon an estimated cost of $5500, at three-fifths of six per cent, as formerly agreed with defendant and as authorized by the schedule of the American Institute of Architects and adopted by the Los Angeles Chapter of said Institute. Plaintiff, on November 16, 1911, at defendant's request, secured an estimate on the construction of the house of $8400. Defendant stated to plaintiff that he could not afford to spend that. Plaintiff then offered to prepare and submit for defendant's inspection, revised preliminary drawings, which he did prepare under instructions of defendant as to details. Defendant then, in a letter to plaintiff requested plaintiff to make statement as to what house would cost according to revised plans. Plaintiff replied that neither he nor anyone else could state accurately the cost of a structure until working drawings and specifications had been prepared and bids taken. Plaintiff offered to prepare these working drawings and specifications and also offered to again revise the plans if they were not what the defendant desired, and in the same letter requested from defendant written confirmation of the original agreement under which he was employed. Defendant soon thereafter returned all plans and refused to pay for plaintiff's services, stating that house would cost about twice the amount he had repeatedly stated to plaintiff that he desired to expend on the structure.

Plaintiff's action is upon two counts: First, upon an express contract; second, upon quantum meruit for value of services rendered. The court held:

That an architect is not bound by an estimate of the cost of a prospective structure, given to client prior to or during preparation of plans.

That such an estimate is hardly more than an expression of opinion, and in the absence of an express contract, limiting the cost of the completed structure, is not binding upon the architect making it.

That the fluctuating prices of building materals and the known and recognized variance in bids of different contractors for the same work render it a practical impossibility for an architect to state, in advance, with any degree of certainty, the cost of a prospectve structure.

Judgment for plaintiff.

Rights of Draftsmen in Illinois to Make Plans for Buildings

The Board of Examiners of Architects for the State of Illinois received at its meeting held in Chicago in March a written opinion from its attorney defining what rights draftsmen and office assistants have under the law in making plans for buildings and what rights are forbidden to them. According to one of the sections of the architects' license law of Illinois it is provided that "Any person who shall be engaged in the planning or supervision of the erection, enlargement or alteration of buildings for others, and to be constructed by other persons than himself, shall be regarded as an architect within the provision of this act and shall be held to comply with the same." Another portion of the same section of same chapter says: "Nothing contained in this act shall be construed to prevent any person, mechanic or builder from making plans and specifications for, or supervising the erection, enlargement or alteration of any building that is to be constructed by himself or employees."

In his written opinion the attorney says: "I am of the opinion that any such draftsmen employees, whether regular or only occasional draftsmen employees, of such 'person, mechanic or builder,' who are engaged in the making of plans and specifications for building to be erected by such 'person, mechanic or builder,' and who perform such work on such plans and specifications as to make the plans and specifications essentially their own, must be regarded as practicing architecture within the meaning of said Section 9, and are liable to the penalties denounced under the act for practicing architecture without being licensed so to do."

* * *

Eliminating Dust from Concrete

A Massachusetts engineer and builder gives two methods which have proved satisfactory for stopping the dusting of floors already built.

The first is to apply a coating of boiled linseed oil and, second, a coating of water glass or sodium silicate. As a rule there is entirely too much working on the surface material in laying concrete floors. As natural stone is much harder than concrete it will resist abrasion much better and therefore the larger percentage of natural stone which can be brought to the surface in laying concrete floors the less will be the dusting. The more the troweling the more will the smaller particles be worked toward the surface. Furthermore, the last of successive trowelings which are common is apt to take place after the concrete has taken its initial set and therefore tends to reduce the strength.

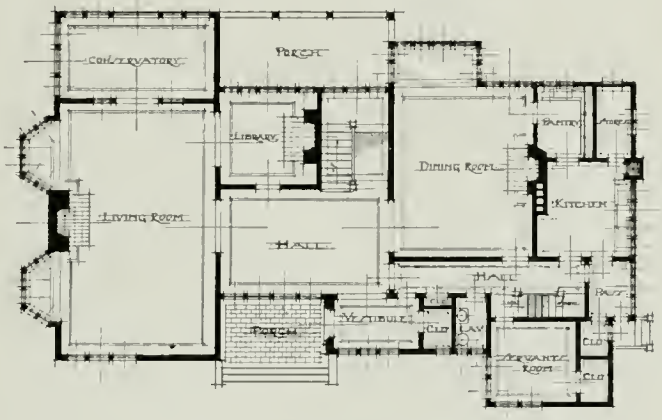
He also states that if the finished floor is laid integral with the underflooring, all being placed in one operation the top layer can be considerably thinner than if applied after underflooring has set.

* * *

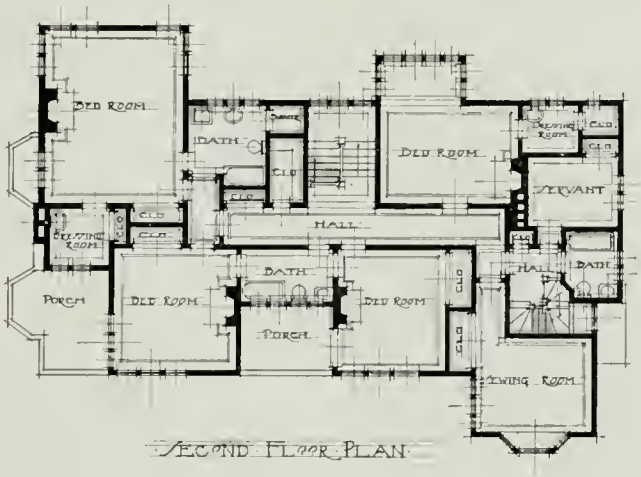
Two Hillside Houses

Architect Albert Farr of San Francisco has completed the plans for two attractive hillside houses to be erected in Piedmont, Oakland. One is designed in the English style of architecture, and the other is Italian Renaissance. Both houses have cement plaster exteriors and one of them is built around a large court, which will be laid out in gardens, fountains and cement walks. The architect's pen perspectives and floor plans are shown in the succeeding pages. The Kimball house will probably cost $20,000, while the estimated cost of the Moore residence is $12,000.

Residence for Mr. E. K. Kimball, Oakland, California
Albert Farr, Architect

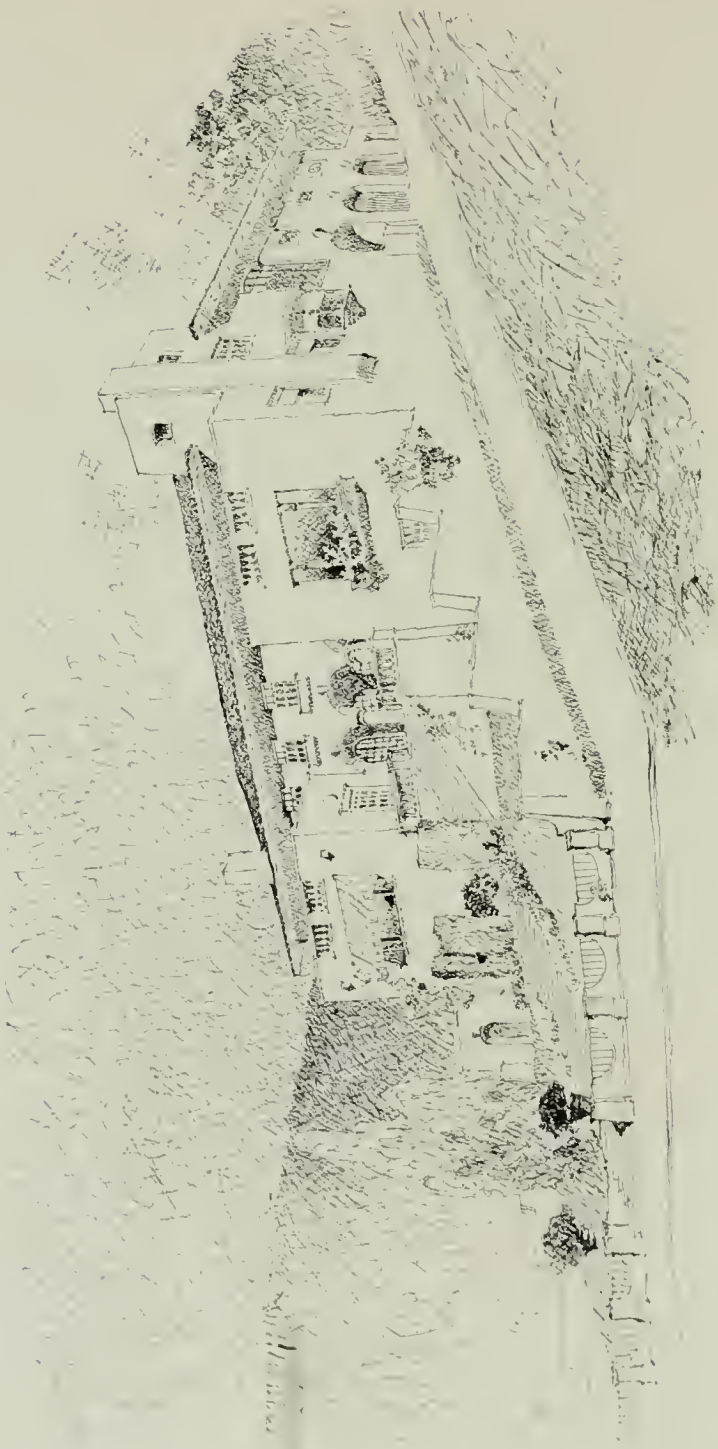


FIRST FLOOR PLAN

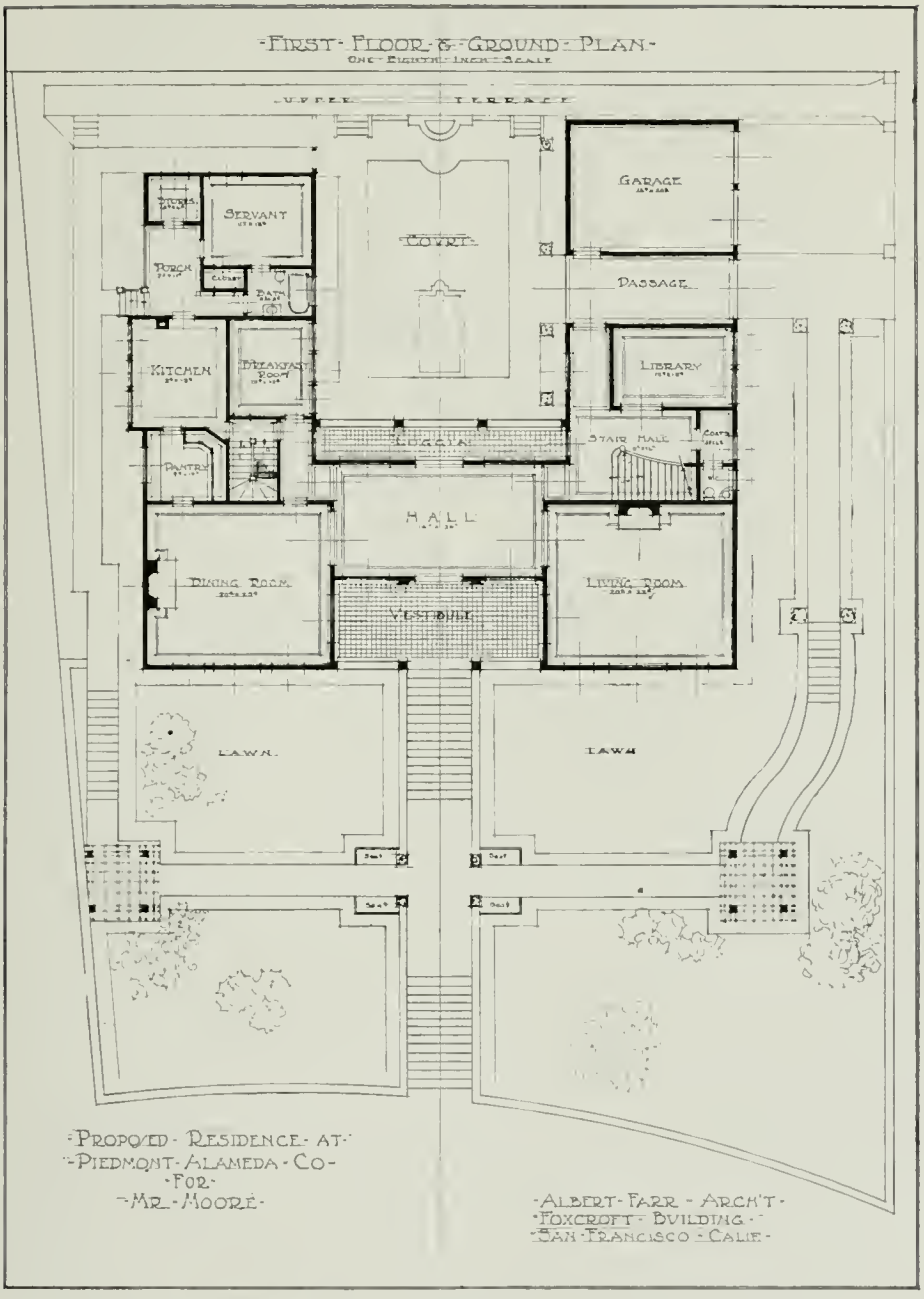


SECOND FLOOR PLAN

Floor Plans, Residence of Mr. E. K. Kimball
Albert Farr, Architect



Residence of Mr. W. N. Moore, Oakland, California,
Albert Farr, Architect



Ground and First Floor Plan, Residence of Mr. W. N. Moore, Oakland, California

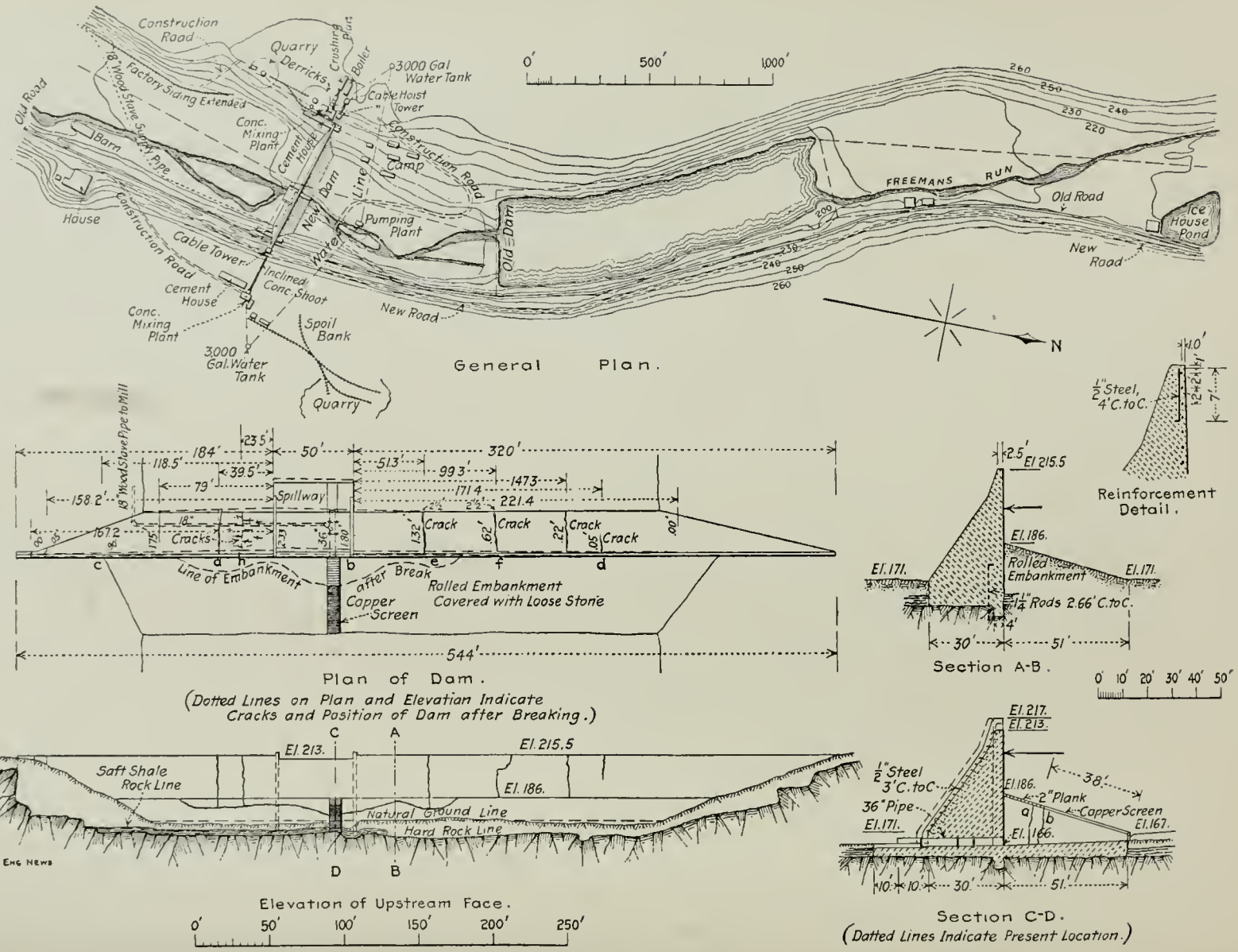


Fig. 1. General Plan of Austin Dam

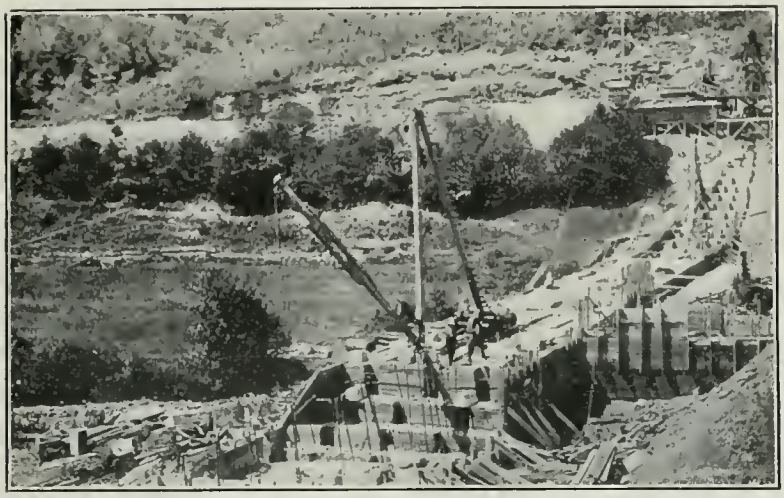


Fig. 2. View of Austin Dam During Construction

The Austin Dam Failure

By FRANK P. McKIBBEN.*

AUSTIN, Pa., before being destroyed by the flood on September 30, 1911, had a population of approximately 2,500. A small stream called Freeman's Run passed through the village, and on this stream above Austin was a concrete dam owned and built by the Bayless Pulp and Paper Company of Binghamton, N. Y. The village of Costello is located further down the valley a few miles below Austin.

The Bayless Pulp and Paper Company used considerable water for manufacturing purposes in their mill, which is located about one and one-half miles above Austin; and about ten years ago this company impounded a reservoir in Freeman's Run, but as the demands on this reservoir increased, the company decided to store larger quantities of water to serve during low stages. Mr. T. Chalkley Hatton was engaged to design and supervise the construction of a concrete dam, which was placed below the old dam and above the Bayless Company's plant and hence above the town of Austin. This dam was begun in May, 1909, and completed about December 1, 1909, the contract for construction being let to C. J. Britnall & Co., of Binghamton, N. Y.

Freeman's Run is only about 350 feet wide at the site of the dam and has steep slopes rising several hundred feet on either side. The valley is quite straight from the dam to Austin, so that when the concrete dam failed on September 30, 1911, the flood destroyed most of the town of Austin, which was located in the valley.

Details of Construction

The following description of the construction and the accompanying Fig. 1 are taken from Engineering News, March 17, 1910.

"The entire valley is underlaid with sandstone rock in horizontal layers running from 8 in. to 3 ft. thick. Between these layers beds of shale and disintegrated sandstone were located, but there were very few vertical cracks to be observed in the bed of rock. Upon the surface of the rock there was from 5 to 8 ft. of earth and compacted gravel deposited from the washings of the side hills. This was so well cemented together that it was removed with the utmost difficulty, and

*Professor of Civil Engineering at Lehigh University.

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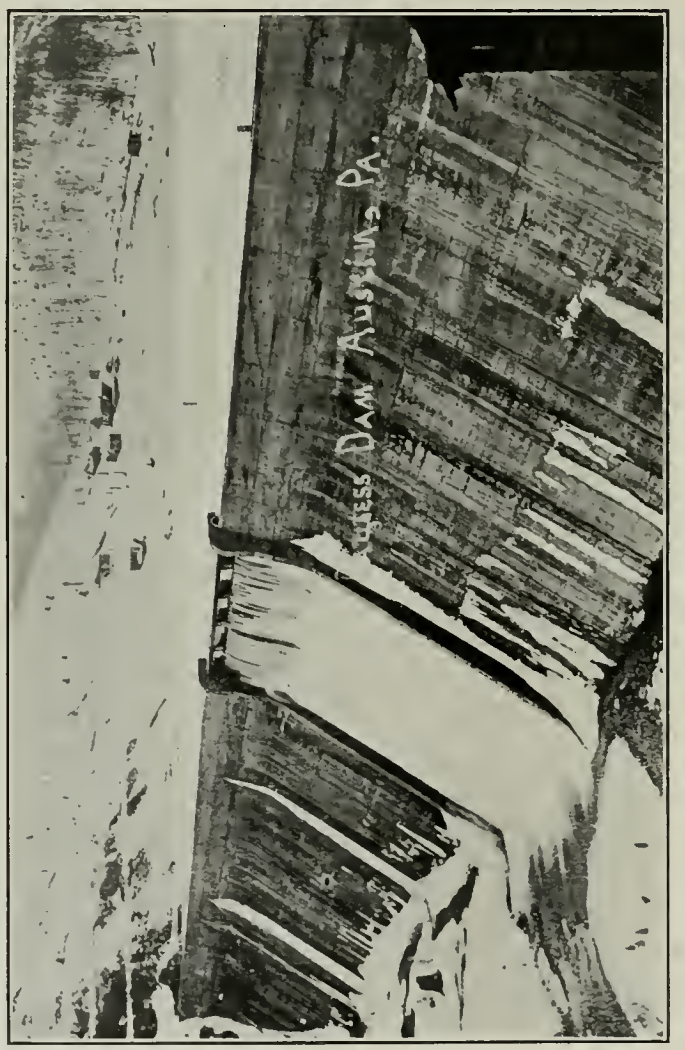


Bayless Dam Before Failure

but little water filtered through it into the foundation trench during construction.

"In preparing the foundation all loose rock was removed and the concrete only started after a solid stratum of at least 2 ft. thick was encountered. The surface of the rock was well washed and grouted. A cut-off wall 4 ft. thick and 4 ft. deep was built, as shown upon plan, Fig. 1, and in every case this cut-off was wall was carried down to good rock. In order to reinforce the dam, twisted steel rods 1¼ in. in diameter and 25 ft. long were built into the wall vertically 5 ft. inside of the upstream face. Holes were drilled into the foundation rock from 5 to 8 ft. deep, and 2.66 ft. between centers, and the steel rods with expansion-bolt heads were placed into these holes, which were then grouted.

"Upon each side of the spillway a pilaster was built which was reinforced by ½-in. steel rods to prevent cracking. The top 12 ft. of the dam was reinforced with ½-in. steel rods spaced 2 ft. vertically and 4 ft. horizontally to prevent cracking. Against the upstream face of the dam an earth embankment was laid at a slope of 3:1 and reached to within 27 ft. of the normal water level at the upstream face of the dam. This embankment was composed of disintegrated shale, clay and some loam, free from large stones, and was carefully compacted by grooved rollers in 6 to 8 in. layers, the work being carefully and well done.

"The dam was composed of cyclopean concrete, with large quarry stones from ½ to 2 cu. yd. size, embedded firmly in wet concrete. These stones were placed so as to break joints, both as headers and stretchers, and surrounded with not less than 6 in. of concrete, generally much more. In every case the concrete was built in sections, stepped up as shown in Fig. 2, and the steps dovetailed both horizontally and vertically. In building into the side hills great care was used in getting down to good firm rock foundation before any concrete was laid.

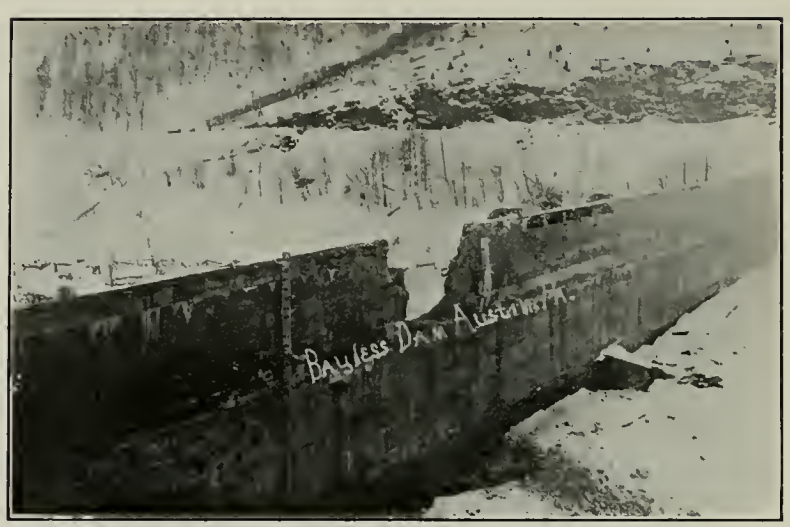
"The material for building the dam was secured from quarries opened at either end of the dam, where duplicate crushers and mixing plants were located. The sand was secured by crushing the sandstones with rolls and screening through sand pans. The composition of the concrete was one part Portland cement, three parts of sand and six parts of broken stone. Each shipment of cement as received was tested upon the works by the resident engineer, who also made numerous tests to ascertain the difference between the tensile strength when using washed bar sand and the sand secured from crushing the stone. In every case the mixture containing the sand from the crushed stone gave the greater tensile strength.

"The concrete was handled in two ways. At the two tends it was run down chutes upon the dam, and there shoveled into place. In the middle of the valley the cableway stretched across the valley carried the concrete in buckets to the wall where it was shoveled into place. In every case it was well turned over and mixed after leaving the mechanical mixer."

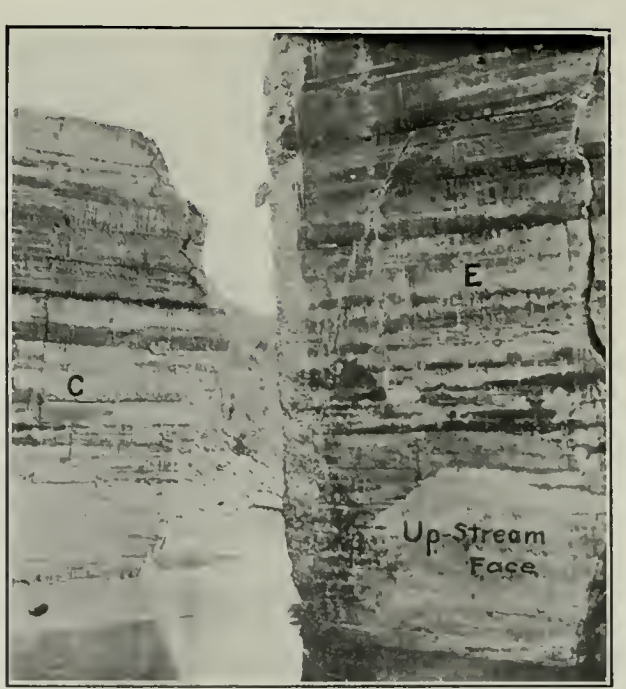
Referring to Fig. 1, it is seen that the dam was 544 feet long and that the maximum section was practically 50 feet in height, 30 feet thick at the base, diminishing to 30 inches at the crest, with upstream face vertical and downstream face inclined.

The Preliminary Failure of January, 1910

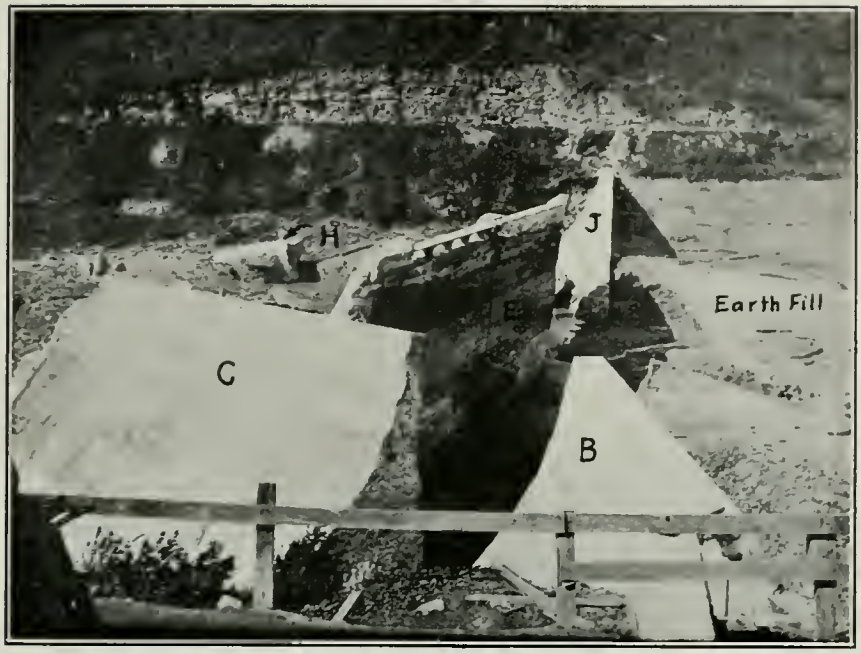
After completion in December, 1909, and before there was any water in the reservoir, two vertical cracks appeared in the dam,—one 51.3 feet to the west of the spillway and the other 39.5 feet to the east thereof. These cracks were about 1-16 inch wide and extended from the ground to the crest and were due to contraction. On January 21, 1910, the reservoir was full and water was flowing over the spillway. On January 22, there was a landslide of the east hill on the downstream side of the dam, and water was issuing from this slide. Furthermore, water passed under the structure and came up through the ground on the downstream side several feet below the dam. The next day that portion of the structure between *a* and *b* slid downstream 18 inches at the bottom and 31 inches at the top, and, according to Engineering News, this sliding was "a maximum at a joint *h* and running out to nothing at *c* and *d*." The crack at *a* opened 4 inches; at *h*, 4¼ inches; and at *e* and *f*, 2½ inches at the bottom on the downstream face, but pinched nearly together on the upstream face. The reservoir was then emptied and the water pressure on the upstream face was thus released by removing, with dynamite, an upper portion of the dam at the west end, a large V-shaped section nearly 15 feet



Bayless Dam After Dynamiting in 1910



Looking Downstream



Dam After Failure in 1911, Looking West

Footing of E Visible, View Towards West

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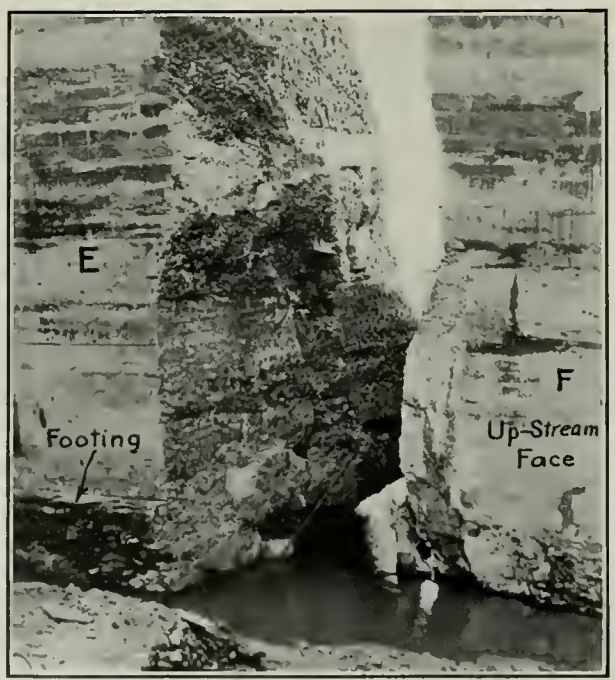
Looking Downstream, Base of D Visible



Opening Between E and F

deep just east of the spillway, and also a wooden cap from the downstream end of the clean-out pipe. After the reservoir was emptied it was seen that the rolled embankment which had been originally placed against the upstream face, as shown in Fig. 1, had been washed out for a distance of about 100 feet on each side of the intake chamber and that each side wall of this chamber had a crack about 18 inches wide. These side walls of the chamber were perpendicular to the dam's upstream face so that a motion of 18 inches at the bottom of the dam caused a corresponding crack of 18 inches in the walls, and a portion of each wall remained attached to and moved with the dam when it slid.

Cause of Failure in 1910

The cracking and movement of the dam above described was attributed to the sliding of the dam "due to the water getting under the foundation, softening up a stratum of clay or shale lying between two layers of rock and permitting one layer of rock to slip forward about 18 inches upon the lower layer." After the structure had thus failed, nothing was done to strengthen it, but water was again allowed to collect behind it so that in March, 1910, there was a depth of 36 feet of water in the reservoir, and later in the same month the water rose to within 2 feet of the overflow and two streams were passing under the dam, appearing about 10 feet below the toe, and another stream was passing around the east end of the dam. It is evident that the clean-out pipe was closed so that the reservoir had considerable water in it within two months after the first failure.

Proposed Strengthening After the Failure of 1910

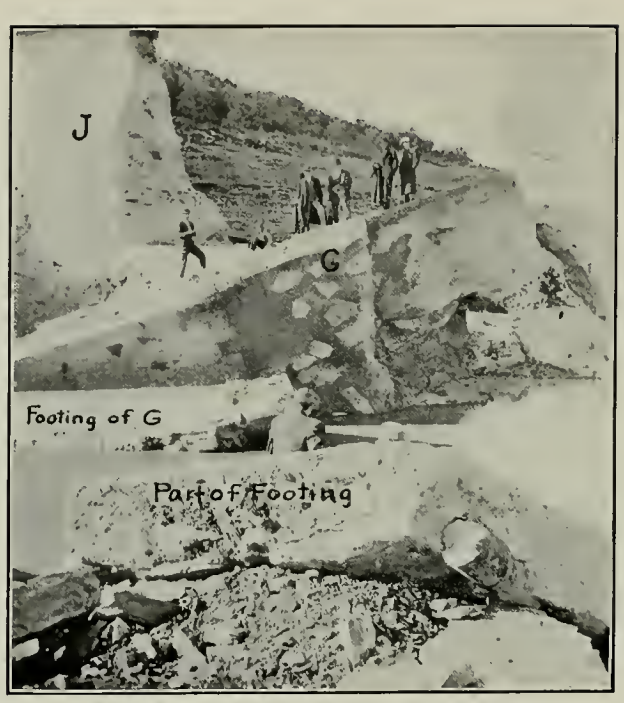
After the dam slipped and cracked in February, 1910, the owners had Mr. Hatton submit a plan for strengthening the structure, but nothing was done to carry out the recommendations made. When the dam failed on September 30, 1911, seventy-seven people lost their lives and the two villages of Austin and Costello were practically destroyed. Between the preliminary failure of 1910 and the disaster of 1911 practically nothing had been done to strengthen the structure.

The Demolition of the Dam on September 30, 1911

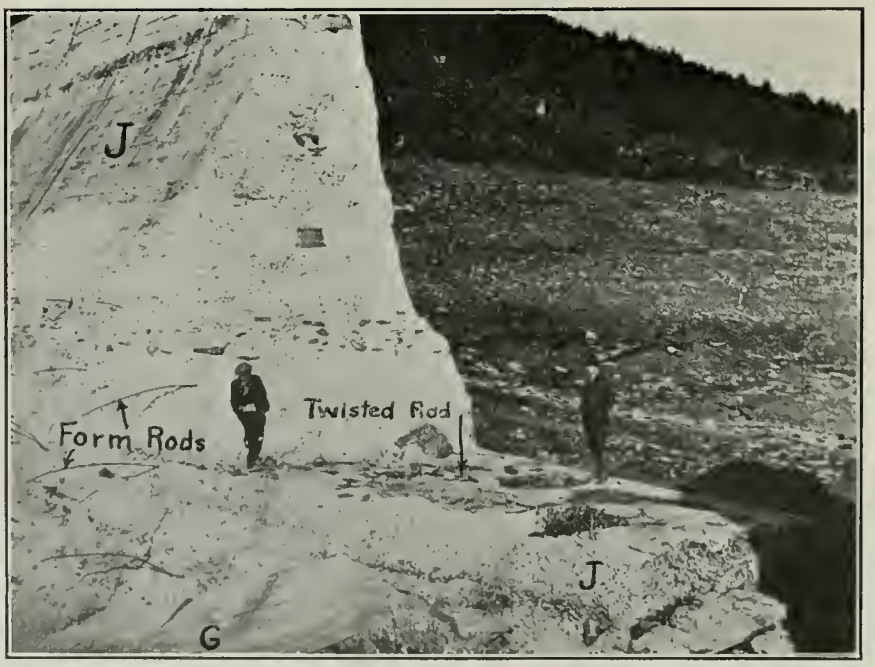
On the morning of September 30, 1911, water was issuing from the cracks in the dam, and in the early afternoon water was flowing over the spillway. At 2:20 p. m., the portion of the structure at the bottom near the west end burst forward and was immediately followed by a complete demolition of the structure.

Conditions of the Structure After Demolition of 1911

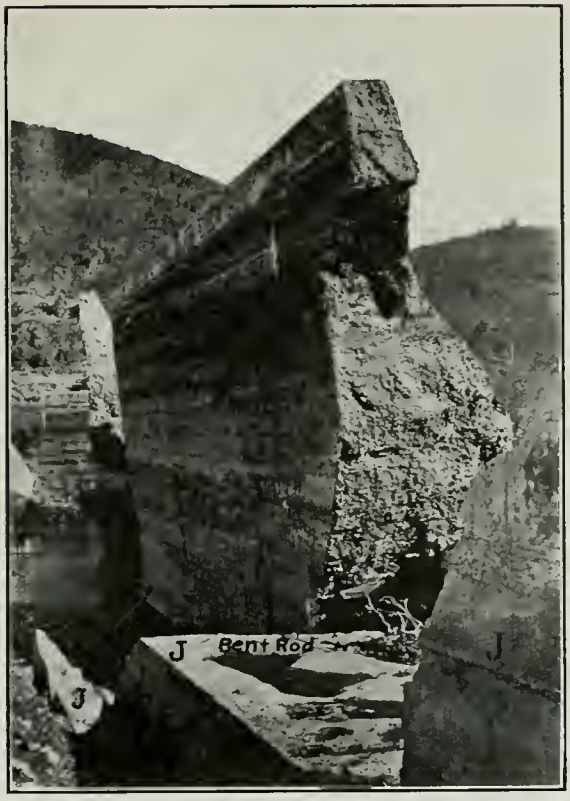
The speaker examined the wrecked structure on October 2 and 3, 1911, and again quite carefully on October 31 and November 1, 1911, and as a study of the fragments yields valuable information and throws much light on the cause of the failure, a detailed description of the broken dam will be here given. Of the original length of the dam, about one-fourth, or 129 feet, remains practically intact, the balance of 415 feet having been broken up and moved downstream. Referring to Fig. 4 it will be seen that a short piece, *A*, at the east end remained practically intact as did also piece *J* at the west end. Between these two end pieces there are seven large fragments, and although there are many smaller pieces of the dam lying as far as several hundred feet downstream from *F* and *G*, it is with the nine major pieces *A* to *J*, inclusive, that most interest centers. As one examines the structure he is impressed with the fact that four of the largest sections moved, namely, *B, C, E, F,* simply slid downstream, remaining nearly vertical, and are now standing from 5 to 50 feet below, and rotated from the original alignment of the structure. The



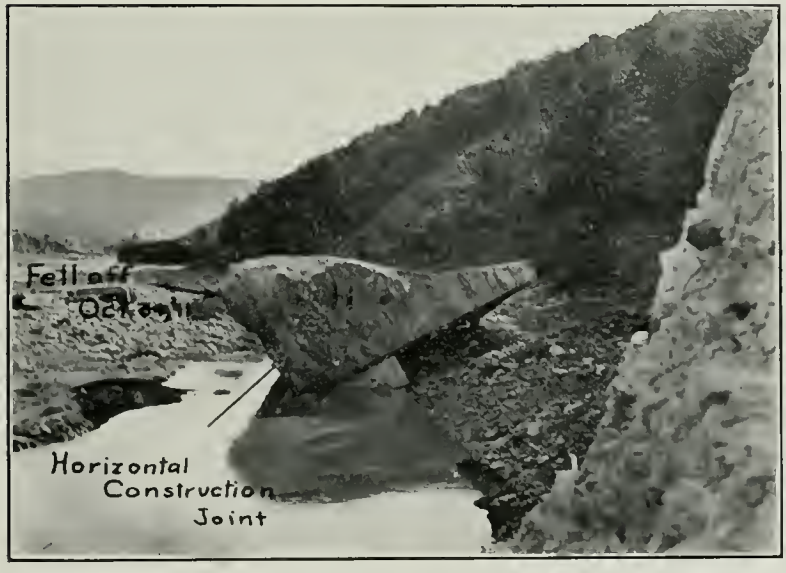
Looking Upstream, Separation of Footing from G



Looking Northwest, Horizontal Joint of J from which Fragment H came



Looking East, Horizontal Joint of J



Looking Downstream, Fractured Surface of H

other three sections were moved downstream and overturned. The earth fill has been washed out immediately behind the dam, but a considerable area of this fill, together with its slope-paving, remains in place, thus leaving a rather steep bank on the side of the fill towards the upstream face of the dam. As water rushed through the openings between the broken sections, it washed out a large basin at the west end, below and around fragment *G*, and a smaller one opposite the opening between *E* and *F*. The stream now passes through the earth-fill at the sluice-way walls, which remain nearly intact, thence around the east end of large fragment *E* through the easterly gap between *E* and *B*. Water stands in the basins below and around the fragments, so that only the upper part of the footing course is visible on a few of the pieces.

Except for a few small cracks, section *A* is intact in its original position and is 19 feet long on the crest. At its westerly end its maximum thickness is about 4 feet. The east bank almost entirely covered this fragment, but erosion has exposed it to view.

Section *B*, 39 feet long on the crest, remains upright but has rotated through an angle of about 10 degrees, and because of rotation and its sloping east face, the east end of the crest has moved upstream 3 feet, while its west end has moved downstream 6 feet. The upper part of the footing course is exposed and shows that the dam and footing are not separated but have moved together, the plane on which sliding occurred being below water level either at the junction of the concrete footing with the rock stratum or else between two strata underlying the concrete. At the westerly end this section is 18 feet 9 inches thick at a depth of 38 feet below the crest, continuing with this thickness to the base, which is 49 feet 6 inches below the crest. A greater part of this piece was embedded in the hillside, and though the wisdom of reducing the thickness of the base of a 50-foot dam from 30 feet in the valley to 18 feet 9 inches in the bank may be seriously questioned, nevertheless this reduced thickness has absolutely no bearing on the failure of the Austin dam.

Section *C*, about 75 feet long on the crest and 90 feet at the base, broke squarely through the dam from crest to bottom, except that the west upper corner is broken off. This broken corner corresponds in size and position to a portion of the gap that was made east of the spillway in 1910 by blasting, and which was later filled with a V-shaped mass of concrete. Section *C* has moved about 50 feet downstream, rotated through an angle of 60 degrees and remains standing on its base in practically an upright position, though its top is slightly tilted upstream and the crest is about 5 feet below its original level. Here is perfect evidence of sliding, but whether rupture took place on a horizontal plane in the concrete footing, or on one between the concrete and rock bottom or on a plane between two rock strata, can be determined only by pumping and excavating. The only rods visible in this fragment are small form rods projecting from the east ruptured surface. A part of the footing course is visible above water.

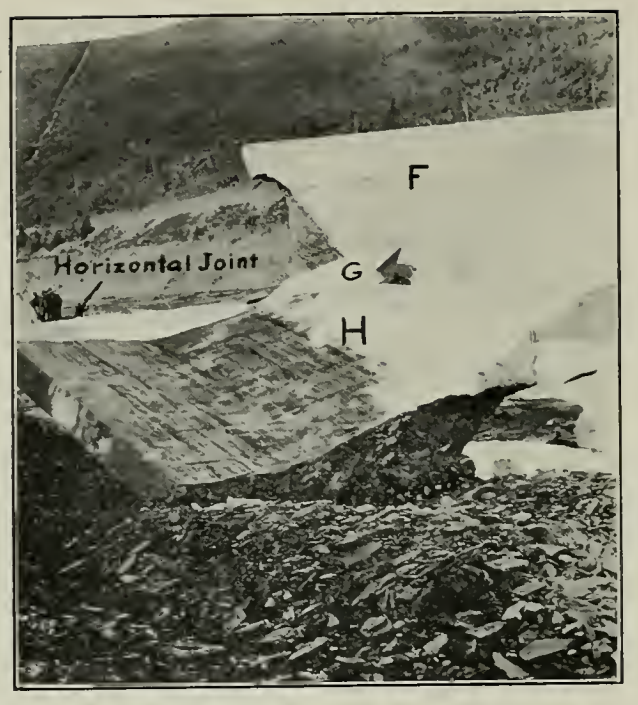
Section *D*, which lies about 100 feet downstream, is the lower portion of the dam and came from the gap between *C* and *E*, the upper part being washed away. Section *D* corresponds to the short piece east of the spillway between the two old cracks shown on elevation of upstream face in Fig. 1, and is without doubt the part of the original section which was under the portion blasted out east of the spillway, and the depth of the notch made by blasing corresponds very closely to the depth of the part that is missing. The section *D* lies on its west fractured plane with a large part of its base exposed above water and with its original upstream face vertical and making an angle of about 45 degrees with the dam. Its average length is about 16 feet, thus corresponding with the 16-foot section between old cracks *a* and *b*, Fig. 1.

The fact that this fragment came from under the blasted portion, with which it must have had a very poor bond, and from between the two cracks, together with the fact that it is so far removed downstream, and that fragments *B, C, E* and *F* are all turned towards it, points very strongly to this as one of the first pieces to give way. It should be remembered, too, that this section *D* was at or near the point of maximum movement of 1910. Hence, many things point to first failure having occurred at section *D* by sliding, and if the eye-witnesses to the failure are correct when they testify, as they have done, that the first break occurred near the west end, it must be said that since there are also good reasons why failure should occur at the west end, and that as the time interval between the collapse of the two portions under consideration must have been very small, it is either impossible to tell which gave way first, or else the witnesses could not clearly record the proper sequence of events which must have occurred so quickly. It makes little practical difference which section moved first since both were unsafe and there were ample reasons why both should fail. There is no visible shearing or splitting of any of the sections near the east end as are so evident at the west end. The base of this small section *D* is quite smooth and is covered over about one-half its exposed area with a very thin layer of rotten shale varying in thickness from ¼ inch to 1½ inches and adhering to the concrete. Here is absolute proof that this section was placed on quite a large area of thinly stratified rock of a rotten texture. This section clearly slid on its base on a horizontal plane at junction of concrete and the thin shale. Parallel scratches in this shale indicate sliding. There are six 1¼-inch twisted rods projecting from the bottom of Fragment *D*, five of which are broken by tension, the sixth having pulled out of the foundation, and all are bent. There is excellent evidence that no cut-off wall existed on this section.

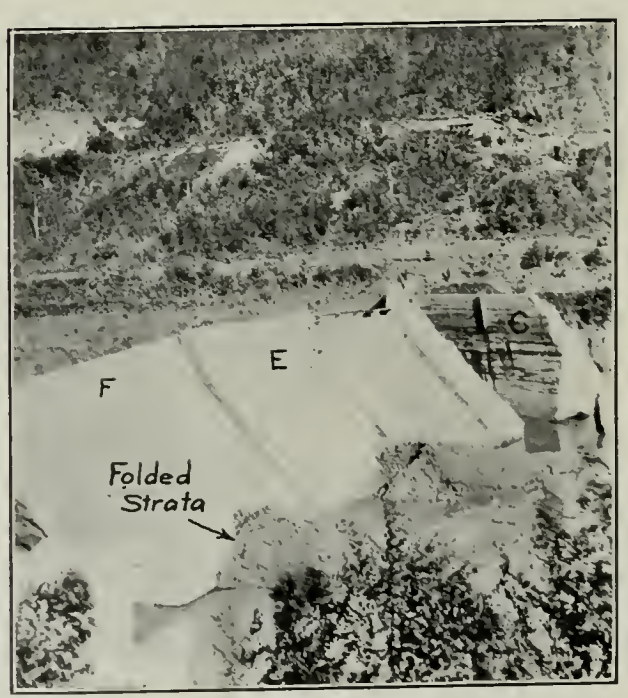
Section *E* contains the spillway; is about 115 feet long on the crest and has slid downstream 36 feet at its east end and 20 feet at the other. Its thickness at base measures 30 feet. It stands practically upright except that its east end is about 4 feet below its original elevation, while the west end is within 1 foot of that level. The upper east corner is broken off as if along the junction with the blasted section east of the spillway. This fragment *E* is the largest of all the pieces, and that it has slid on or in the rock strata, and not at the top of the footing, is clear because a considerable portion of the footing is visible on the upstream side. A large vertical crack in the east end of the spillway section nearly divides this fragment into two pieces. Except for a large smooth vertical area on the west ruptured surface of this section, caused by wooden forms in construction, there is nothing further about this piece that calls for comment.

Section *F* is also a large fragment having a length on top of about 90 feet and on the bottom of about 70 feet, standing slightly tilted upstream with its east end 25 feet and its west end 20 feet downstream. The crest at the west end is several feet below its original level and at the east end it has sunk only a small amount. There is nothing of special note about this section more than to state that it has slid on or in the rock strata and that its west ruptured section instead of being a fairly complete transverse plane is ragged, with the crest overhanging the lower part of the fracture. A part of the footing is visible above water.

Section *G* varies from 26 feet long at its upper edge to 47 feet long at the bottom and lies on its upstream face below the dam with its base downstream. The upper part of this section for a depth of 6 feet 6 inches below the crest has separated on a large smooth plane and has been washed downstream, a part now lying under fragment *H*. What is of greater importance is that the footing course has parted from the main portion of the dam and



Looking Upstream, View Shows Downstream Face of H



Looking East, View Shows Downstream Face

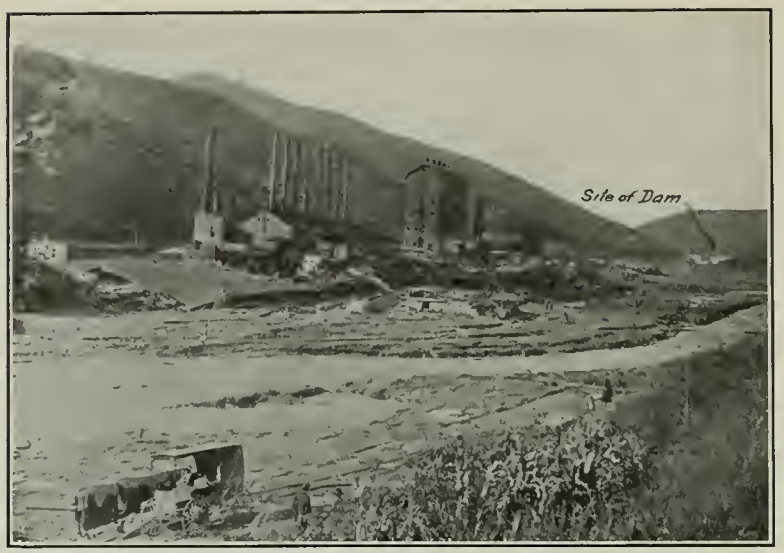
lies a few feet from it. The bottom of the main portion and the top of the footing, which were originally horizontal, are very smooth, showing clearly that this large area was a horizontal joint through the dam at junction of main section and footing, the visible part of which averages 15 feet wide by 31 feet long. From the position of the footing it is apparent that this section *G* slid out at the bottom on a plane between the concrete and rock, and being somewhat held at the crest, was turned over so that its crest fell upstream, the footing separating from the main section during this movement. As previously mentioned, eye-witnesses have testified that the first break occurred at the bottom near the western end and if they are correct this is undoubtedly the piece that first gave way. The dam slid upon the rock at this point. No reinforcing bars whatever show either on the base of the main portion or in the footing as far as these are visible, but nine 1¼-inch twisted rods are projecting from the long pointed part of fragment *J*, on which fragment *G* originally stood. Of these nine rods, five show tension breaks with a reduction of area of 50 per cent, while the other four rods are bent downstream but are unbroken.

Section *H* has moved 110 feet downstream and is lying on its upstream face with the crest pointing towards the west. It is 34 feet long on the crest and is the upper 34 feet of the main section of the dam. Except for one projection mentioned below, this fragment had a fairly smooth base, thus showing the presence of a horizontal construction joint. In other words, this section slid off at a horizontal joint 34 feet below the crest and was originally between *G* and *J* and resting on a flat portion of *J*, which is still in place. This is the only place in the entire structure where concrete slid on concrete, and with the exception of section *G* is the only piece in which there is an important separation of concrete on a horizontal plane. On October 29, 1911, this fragment *H* broke in two from cantilever action on a horizontal construction joint 17 feet below the crest, showing a smooth surface 9 feet 9 inches by 29 feet. On the night of October 31 a large slab 15 feet by 8 feet by 3 feet 6 inches thick, which had been projecting from base of section *H*, fell off, thus leaving the base of *H* a fairly smooth badly discolored surface about 21 feet by 20 feet.

Section *J* is intact, and for a distance of 110 feet along the crest is in good condition. At its easterly end there is a step 34 feet high, and at the bottom of this step the concrete has a horizontal surface, trapezoidal in plan, 21 feet long and varying in width from 10 feet to 15 feet. This is a construction joint of nearly 260 square feet, and is for the most part quite smooth. It has six 1¼-inch square twisted rods projecting 3 feet from it, but these rods are all bent downstream. It is from this horizontal plane that fragment *H* came. To the east of this place, section *J* is spalled badly, finally terminating in a long low point as described above under the head of section *G*.

The concrete is for the most part very good, except for the horizontal joints near the west end already discussed, and for large flat pieces of stratified stone so embedded in the concrete in positions to cause horizontal planes of weakness. Large areas of these horizontal joints are covered with laitance. An experimental determination gives the actual weight of concrete as 152 pounds per cubic foot. There are very few reinforcing rods visible at the fractures. All fractured vertical surfaces except that between sections *A* and *B*, and that between *H* and *J*, are discolored by long contact with water, thus showing that the dam broke into fragments at the old cracks.

On each side of the basin washed out by water flowing between sections *E* and *F* there is a remarkably interesting illustration of the effect of the horizontal pressure due to the motion of these two heavy masses of concrete. As *E* and *F* slid downstream, the thin strata of sandstone and shale were folded upward at the toe of the structure to a height of 10 feet, and the water cut-



Site of the Austin Dam

ting through this fold left a perfect section of the folded strata exposed to view.

The Cause of the Failure

The dam failed by sliding, first at fragment *G*, where all concrete slipped on the underlying strata, and probably immediately thereafter at the horizontal construction joint under fragment *H;* and then fragments *F, E, D, C* and *B* slid forward on the underlying strata. And here lies the cause of the collapse. When water penetrated the joints and the foundations, the dam required a coefficient of friction more than 0.87 to prevent slipping, while the material on which it was placed could offer a coefficient of possibly not over 0.50, and probably not over 0.33. The coefficient of friction of concrete on concrete is probably not over 0.66.

The Influence of Vertical Steel Rods on Sliding

Fig. 1 shows that rods 1¼ by 1¼ inches in section and 2 feet 8 inches on centers were to have been placed as anchorage against sliding and uplift at upstream end of the base. At the horizontal construction joint forming the junction between fragments *H* and *J* there are six of these rods in a length of 21 feet, and on the long point of fragment *J* nine rods are visible. It is very doubtful whether these rods were placed as closely as 2 feet 8 inches on centers, and even if they had been so placed their effect would have been very small. The shearing strength of vertical rods cannot be developed when gripped between two masses of concrete because of the splitting of the concrete. However, assuming that the rods could have developed their full shearing strength and that they were spaced 2 feet 8 inches on centers, the following computation is applicable.

Total horizontal force at base	=78 125 lb. per lin. ft. of dam.
Deducting friction=0.50 (91 475)	=45 728 " " " " " " "
Leaving amount to be carried by rods	=32 397 " " " " " " "

Each rod carries $\frac{3}{8}$(32 397)= 86 500 lb. total shear, or 55 000 lb. per sq. in.

Hence, even with the large friction coefficient of 0.50, it is seen that each

rod must carry 80,500 pounds or 55,000 pounds per square inch in shear. This is inconceivable. One who has tested rods in shear realizes how rigidly they must be held in the grips to make them fail by shear.

Summary of Main Facts

The failure of this dam is due to sliding as a result of faulty foundation, faulty design, faulty construction and faulty operation.

The material upon which the dam was placed consists of thin layers of shale and sandstone. In at least one place covering an approximate area of 100 square feet this shale is very poor, where a layer varying in thickness from ¼ inch to 1½ inches adheres to the upturned bottom of the dam, showing clearly many scratches due to the sliding of the dam. On the other parts of this bottom the concrete is exposed, with none of the thin layers of shale attached to it. This shale is so soft and can offer so little resistance to sliding that the dam slid upon it.

Calculations on and an examination of the wrecked structure show the design of the dam to be faulty in that the base was practically level, was not stepped, and was not carried deep enough to resist sliding, and that proper provisions were not taken to prevent the percolation of water under the dam. The structure shows that in its design no allowance was made for upward water pressure in the joints or under the base and hence the thickness of the dam was entirely too small. In view of the character of the foundation, this is a serious mistake.

Faulty construction in the dam is shown in many places, especially near the western end, where large fairly smooth joints passed horizontally through the structure. These planes of weakness should not have been allowed to exist and are due to the improper method of laying the concrete in large horizontal layers, and allowing one layer to harden before the next was placed upon it. On many of these horizontal construction joints laitance formed and was not removed, thus making the joint less capable of resisting sliding, because of the smoothness and weakness of this laitance. One section of the dam at the west end slid on one of these horizontal construction joints within the concrete at an elevation of 34 feet below the top of the dam. Furthermore, the large stones placed in the concrete were of such poor material and were so placed in nearly horizontal layers as to weaken the structure's resistance against sliding.

The operation of the structure, i. e., its use after completion, was faulty in that after the dam had once failed by sliding, in January, 1910, water should not, under any circumstances, have been allowed to collect in the reservoir behind the dam until the latter had been put in a safe condition.

Lessons Emphasized by This Failure

1. A thorough knowledge of the underlying materials is necessary before a dam can be properly designed or built.

2. No dam should be placed on poor materials consisting of disintegrated or stratified rock without taking proper precautions to prevent water from getting under the base or between the underlying strata, and if such prevention be impossible, and the dam must be built in such a location, then it must be designed with full upward pressure and with large factors of safety against overturning and sliding.

3. Greater emphasis must be laid on sliding as a possible method of failure, and proper precautions must be taken to prevent destruction in this manner. Factors of safety against sliding are frequently taken too small.

4. It is desirable to secure more accurate information concerning the

coefficients of friction of various materials and the effect thereon due to wetting of these materials.

5. Upward pressure due to intrusive water should always be assumed in design, and in extreme cases should be taken larger than is now customary; say, equal to the full hydrostatic pressure over the entire area of the base in cases of poor foundations. While this is no doubt unusual, it is necessary, especially since practically all dams leak to a greater or less extent and since only a factor of safety of two against overturning, and one scarcely as large against sliding, are frequently used even when no upward water pressure is considered. For overflow dams the vacuum effect must be allowed for unless eliminated, and in design of dams in cold climates ice pressure must be considered.

6. Greater care should be taken to avoid large horizontal construction joints as well as large vertical planes of weakness so arranged as to reduce their shear carrying power. In this connection it must be realized that cyclopean masonry the use of large stratified rocks or of any large rocks so placed as to produce horizontal planes of weakness should be carefully avoided. Before depositing concrete on a hardened concrete surface all laitance must be removed and the joint properly prepared.

7. It is important to have competent state supervision of all dams, reservoirs and bridges, which, while not relieving the owners from their responsibility, will provide an additional safeguard to life and property.

* * *

Painting the House

For those who wish to give their houses a fresh coat of paint, it may be interesting to know that most architects have generally discarded the so-called "Colonial" effect of yellow ochre with white trimmings, and that, for large houses, plain white lead for the exterior is more and more in favor. There was a time, says a writer in "House Beautiful," when white for country houses was denounced as "glaring" and "vulgar;" but architects, who have no time to spare for sentimentalizing, and who remember the ivy, geraniums and purple clematis trailing over the whitewashed Italian walls, or the passion flowers and roses casting shadows on white French and English villas, know well that no other color adapts itself so well to stately and beautiful rural effects. For small cottages, especially where they are near the street, and need to be made as unobtrusive as possible, the olive greens once popular among architects have been revived, with great advantage. Builders whose attempts to produce soft effects with emerald green or medium chrome have not been crowned with success, do not sympathize with the architects in this matter; but a really good broken green is one of the most charming and lovable colors that can be put on the outside of a small house, well buried in shrubbery. It is hardly necessary to say that red cornices should be avoided.

* * *

When Woman Wins

'Twas in the year 2011, and the intrepid general was rallying her wavering troops.

"Women," she cried, "will you give way to manly fears?"

A timid murmum ran through the ranks.

"Shall it be said we are clothed in mail armor?" shrieked the leader.

The murmur grew more confused.

"Will you," came the taunting cry from their gallant general, "show the white feather at this time of the year, when feathers are out of fashion?"

"Never!" roared her noble followers. "Never!"

And forming themselves into battle array, they once more hurled themselves relentlessly upon the enemy.

California's State Highway*

By AUSTIN B. FLETCHER, M. Am. Soc. C. E.
Highway Engineer, California Highway Commission, Department of Engineering, State of California.

THE California Highway Commission has been engaged in its duties very nearly one year. On August 7, 1911, the appointed members of the Advisory Board of the Department of Engineering, Messrs. Towne, Blaney, and Darlington were commissioned by the Governor and as soon thereafter as possible the Advisory Board appointed them as an executive committee of the department to be known as the California Highway Commission, giving to them as complete control over State highway matters as the law permits.

California, unlike the Eastern States, did not provide for a commission to investigate the needs of the State in the matter of highways before appropriating money for their construction. The California State Highways Act, which is the law and the gospel under which the State highway routes must be selected and in accordance with which the roads must be built, in a general way, outlines the routes.

In the language of the Act: "The route or routes of said State highways shall be selected by the department of engineering and said route shall be so selected and said highways so laid out and constructed or acquired as to constitute a continuous and connected State highway system running north and south through the State, traversing the Sacramento and San Joaquin valleys and along the Pacific Coast by the most direct and practicable routes, connecting the county seats of the several counties through which passes and joining the centers of population, together with such branch roads as may be necessary to connect therewith the several county seats lying east and west of such State highway."

The precise meaning of the section of the Act just quoted has given the public, the commission, and its legal advisers food for much thought.

There is no doubt that a line down the coast and a line down the Sacramento and San Joaquin valleys were contemplated, but how to connect the county seats and the centers of population by the "most direct and practicable routes," and to connect the county seats east and west of the State highways by branches so as to satisfy the law and the people is a problem difficult of solution.

Fortunately, except in perhaps a half dozen instances, it seems probable that there will be no serious disagreement as to the proper location for the routes.

It is natural that each community should wish to have the main line of the highway pass through its borders, and it is obvious that such a line would be so meandering as to be impossible because of its indirectness and consequently greatly increased length.

The commissioners have been obliged to take a broad view of the subject. The State highway system must be planned from a State-wide viewpoint and no undue emphasis should be given to the desires of the communities themselves. In the absence of rulings by the courts, it would seem that the command of the statute that the State highway shall follow the "most direct and practicable routes," clothes the commissioners and the advisory board with a good deal of discretion in locating the lines of the highways.

Acting upon that belief the commission has in a few instances proposed to locate the main route of the highway in such a manner that one

*Read at the meeting of the Pacific Highway Association, San Francisco, August 5, 1912.

or more county seats would not be on it and could reach it only by a lateral. In several cases such action has aroused a storm of protest. All sorts of reasons have been credited to the Highway Commission and to the administration, it having been even alleged that the State highways are being routed for political purposes and to buy votes. It hardly seems to be worth while to deny such allegations. The writer disclaims any close acquaintance with so-called practical politics, but he has been engaged in public work for so many years that he believes himself able to smell the animal when it is prowling about. Not only has he seen no evidence of politics in highway routing, but on the contrary the accredited friends of the administration have abused the highway commissioners for their proposed routings more than have its enemies.

The highway work, in all its roots and branches, has been and is singularly free from the sinister machinations of practical politicians.

Early in its work the commission chose certain main routes as follows:

Route 1.	San Francisco to Oregon line	(421 miles)
Route 2.	San Francisco to San Diego via Los Angeles	(592 miles)
Route 3.	Sacramento to Oregon line via East side of river and Redding	(344 miles)
Route 4.	Sacramento to Los Angeles via San Joaquin Valley	(445 miles)
Route 5.	Stockton to Santa Cruz via Oakland	(133 miles)
Route 6.	Sacramento to Woodland Junction	(20 miles)
Route 7.	Tehama to Benicia	(191 miles)
Route 8.	Hopland to Vallejo via Lake County	(107 miles)
Route 9.	Los Angeles to Riverside	(46 miles)

These routes make a total length of approximately 2,300 miles. To complete the system apparently contemplated by the Statute, several hundred miles more of laterals and connections must be provided for.

In order to secure what the commission considered the most efficient organization, conforming to the lines of the best practice among the large corporations, the following plan was adopted:

The highway engineer was made chief executive, corresponding in his relations to the different departments of the commission to the general manager of a large private corporation. Without reference to the public character of this work, the plan of dividing responsibility is along the same lines as if this commission was a private corporation engaged in the business of building roads. The highway engineer (or chief executive) has directly responsible to him the following divisions or departments of the work.

The Engineering Department is under the working supervision of the assistant highway engineer. The work of this department is divided into eight subdivisions, viz: The headquarters, the Division Numbers I, II, III, IV, V, VI, and VII, which represent the headquarters of work in the different parts of the State. Each one of these divisions is in charge of a division engineer, reporting directly to the headquarters office.

Reporting directly to the highway engineer is the Purchasing Department, which will be in charge of all purchases, materials, equipment, etc., and will also have control and direction of the traffic work later on when the department is transferring material and equipment from one place to another. Up to the present time the highway engineer has been handling this department of the work with his engineering staff.

Reporting directly to the highway engineer is the Accounting Department, which is responsible for the records and accounts of the commission. The work of this department is transacted chiefly in the headquarters office, building up from records and reports sent in from the division offices.

The total number of people in the employ of the commission July 15, 1912, was 260.

With the exception of the secretary, his assistant and the attorney, all employees of the commission have been required to file applications stating their experience and giving references as a prerequisite to employment. The writer, who has recommended for employment 257 of the total 260 employees, is happy to be able to assert that he does not know the political inclination of any one of them. They were all selected because they were supposed to be especially fitted for the duties entrusted to them.

The payroll for the month ending July 15, 1912, shows that the average monthly salary of the 260 employees already accounted for is $91.02.

From time to time since January 1, 1912, the commission has ordered surveys on the various routes as fast as general routing problems were settled. In some cases reconnaissances only were ordered. In others two or more surveys were ordered between objective points to determine which was the best. At the present time 31 survey parties are engaged in such work and the surveys are proceeding as rapidly as careful work will permit.

The survey notes go from the field to the division offices where the plans are made by the draughtsmen. Ultimately they are sent to the headquarters at Sacramento with the reports of the division engineers for revision and correction when necessary. To this date approximately 1,500 miles of road survey have been ordered by the commission, and of this mileage nearly 800 miles of field work has been completed and more than 200 miles in addition is in process. The survey orders were carefully distributed throughout the seven divisions and no portion of the State is being neglected.

The surveys ordered and made are considered as tentative only and when necessary the lines are changed to conform to new conditions which arise; but, as a rule, the commission has given earnest consideration to the needs of the State before ordering the surveys. Even in the flat country such surveys cost too much money to be ordered at random.

In brief the standard road which the commission proposes to build, will have the following principal characteristics:

1. A right of way not less than 60 feet in width where it is reasonably possible and as direct between objective points as is consistently possible.
2. Gradients not exceeding 7 per cent even in the mountainous parts of the State.
3. Curves as open as possible and in no case of less than 50 feet in radius.
4. As many culverts of sufficient capacity as are needed to take care of surface and underground water.
5. A travelled way under ordinary conditions not less than 21 feet in width and in the mountains not less than 16 feet wide, with the center paved or surfaced so as to be hard and smooth under all climatic conditions at all times of the year, the width of surfacing to be in general 15 feet.
6. Smoothly graded road sides, reserved for future tree planting.

For the main roads of the system the choice for surfacing seems to lie between the so-called oil macadam type and a concrete road with a bituminous surface, the latter being considerably more expensive than the former, but much more desirable as concerns quality and permanency. It is evident that neither type can be adopted for general use unless the cost of the materials and the freight charges for transporting them are reduced to the lowest point possible.

It seems apparent that not less than 2,700 miles of State highway must be built to comply with the provisions of the "State Highways Act." Of this mileage it is possible that one-third, or 900 miles, will be in the mountains, and will require no surfacing other than local gravels, and that 1,800 miles will have to be surfaced with materials more or less expensive.

The commission has been negotiating with the Southern Pacific Company concerning freight rates on materials needed in the construction of the roads.

It is obvious that to secure a high type of work on the main routes, many tons and cubic yards of broken stone, gravel, cement, oil and other materials must be carried by rail, sometimes for long distances, since rarely will such materials be found within wagon haul distance of the work to be done. The cost of railroad freight will be therefore a very large item in the cost of the roads.

A crude estimate shows that the Southern Pacific Company will be concerned in hauling materials for not less than 1,000 miles of the State highway. Otherwise expressed, should the 1,000 miles referred to be built of oil macadam, the railroad will have to transport not less than 2,900,000 tons of broken stone and 260,000 barrels of asphaltic oil during the progress of the work to say nothing of huge quantities of cement, culvert pipe, lumber, reinforcing steel, etc.

The new rates just agreed upon are as follows, for any length of haul:

Stone, gravel and sand—½ cent per ton per mile with a $6.00 per car minimum, exclusive of mountain hauls.

Road oil and bituminous rock—¾ cents per ton per mile, minimum $10.00 per car.

Asphalt—1 cent per ton per mile, whether in tank, cars or packages. Minimum $10.00 per car.

All other commodities—(a) The lowest of any commercial rate or (b) ½ of any class rate. Minimum $10.00 per car.

The latter rate will include cement, steel, culvert pipe and other miscellaneous materials, together with contractor's equipment when shipped marked California Highway Commission.

The writer has not had time to even approximate the probable savings in cost due to these reductions in rates, but it is safe to say that it will be some hundreds of thousands of dollars, all of which will inure to a higher quality of surfacing. Considering the stone, gravel and sand rate alone, the lowest rate heretofore with which the writer is familiar was ¾ cents per mile per ton up to a 60 mile haul, with slowly reducing rates for hauls to 150 miles, the rate for the extreme haul being ½ cent per ton. The minimum rate under that arrangement was 25 cents per ton (about $12.50 per car).

The writer does not believe that the concession in freight rates by the Southern Pacific Company is merely what has been sometimes called "enlightened self interest." In part, at least, he believes it to be due to the desire of the company that the roads be built of the best materials procurable and in the best manner. The instructions of the president of the company to his heads of departments to make the reductions in rates as general, as broad and as low as was consistently possible, indicate the good will of the management of the Southern Pacific Company toward the State highway project.

There are now 37½ miles of State highway under contract in widely separated parts of the State, and 58 miles more are now under advertisement, the bids to be opened during the last week of the present month.

On all the roads now advertised and awaiting contract, it is proposed to use a hydraulic cement concrete base 15 feet wide, covered with a thin surface of a bituminous mixture.

Whether or not much additional work of this character may be done depends largely upon the cement manufacturers.

It is probable that they will make some deduction in the cement price to induce the commission to adopt the concrete base for its standard type

of construction. Whether the reduction in price will be sufficient to permit of so general a use of concrete is not yet determined.

Notwithstanding the sporadic outbursts in the press which are, of course, due to the most part to the heated political atmosphere which prevails at the present time, the general sentiment of the people of the State is remarkably friendly toward the State highway work.

The counties have generously agreed to furnish such rights of way as are needed for re-locating the roads and the commission expects that none of the bridges of the State which are more than 20 feet in span will have to be built with money from the highway fund. Thus far no county has refused to reconstruct such bridges or to build new ones when the commission has made the request.

Of the 31 survey parties now at work, 18 are located on the coast highway between Willits on the north and San Diego on the South.

Every effort is being made to have the main State highway routes completed before the great Exposition at San Francisco opens its doors in 1915.

* * *

Charm in Architecture

ARCHITECTS like to boast of the steady improvement in the design of expensive American houses and in the laying out of big estates, but when asked about our smaller domestic work they tell you it is still far below the standard. The reasons for this are obvious enough. No well trained architect whose education has been a matter of six or seven years and a great sum of money, can afford to design small houses at the established rate. A small house looks like an insignificant problem—so easy of solution every untrained woman in the land is ready to solve it; but the truth is that a house at $4,000 requires twice as much time and study to design successfully as a house at $8,000 for the reason that there never lived a $4,000 client who did not want every convenience and comfort crowded into his little house that an $8,000 man demands in his. Moreover, he is usually a tyro in home-building; his little sum represents the first money he has been able to amass for the purpose; and it takes much patience to persuade him how really little he can expect for it—that he must not expect the number of closets and baths and dens and back staircases and piazzas that can be put into a costlier house. If a small dwelling is to have any distinction whatever, its prime expression must be simplicity. It takes more art to leave out useless ornament and detail than to put it in. A small house is nothing more than the simplest form of shelter for a very few people. To make it an expression of refinement and good taste, and at the same time thoroughly modern as to comfort and conveniences, requires more of the architect's time than he would put on a larger house where his commission would be both actually and relatively much higher.

"If the present minimum fee of six per cent were raised to eight per cent for work of $5,000 and under," says House Beautiful, "really good architects might be induced to design small houses; but in such a case clients of this order would, even more than now, seek the services of the 'builder architect,' forgetting that the quality which small houses lack most and yet need most, is that subtle something called *charm,* and that the man least likely to impart this abiding quality is the builder. Charm is worth paying for. It is to a dwelling what it is to a woman—the imperishable attraction which outlives the pink of her cheek or the raven black of her hair. As Maggie sighs in 'What Every Woman Knows'":

"If you have char-r-m, the bad things you do count nothing against you; and if you are without char-r-m, the good things you do count nothing for you."

Fashions in Building

THERE are fashions in building, just as in dress, and it is as necessary for an architect who wishes to be abreast of the times to make himself acquainted with them as it is for the customer or the tailor to follow the changes in the cut of a garment, says a writer in the London Building News.

Within living memory there has been the fashion for church restoration; there has been that for the Queen Anne country house; there has been another for Jubilee memorials; and yet others for schools, hospitals, and municipal buildings. The fashions have overlapped here and there, and, from the necessities of the case, that for country-house building has been more persistent than any other; but, all the same, each fashion has subsisted more or less for a definite period, and has been eventually superseded by some other.

Church restorations are now comparatively rare, so the young architect spends no great time in becoming imbued with the Gothic spirit. Hospitals, too, whether general or special, are not called for by any means so frequently as they were, nor are municipal buildings, nor even Carnegie libraries. For any young man deliberately to attempt to specialize in any of these directions now is to waste time.

An architect, it must be remembered, must foresee what clients are likely to desire. This is probably not good for architecture, which, if it is to be considered as a living art, should be entirely independent of passing fashions. There are few of us, however, who can be architects in this sense, the necessity for earning a livelihood driving us on to be producers of art rather than artists, much as were the later Greek workers under Roman rule. These are days of strenuous competition, not only in the sense in which "competition" generally appeals to an architect, but in its wider meaning—which means that he had better not wait till a "competition" is announced in which other architects will take part, but prepare a scheme for a building such as is likely to be required, after careful selection of a site and obtaining an option for its purchase, and then to go round among his friends or business acquaintances, and either induce one individual to become his client for the work, or form a small company or syndicate to carry it through.

Competition in merit, as far as the plans are concerned, is eliminated in favor of competition in priority, the principal essential being that the scheme is one which is likely to prove profitable to those who put their money into it. It is here where foresight is essential. The architect must begin preparing his scheme for a type of building in which he recognizes there is likely to be what speculators on the stock exchange call a "boom," and must lay it before capitalists at the time when it is likely to meet with their approval—that is, when the "boom" is coming and before it has burst. He is again in the position of the costumer, forecasting the fashions of next month in order to attract customers when those fashions become established, and not adopting them, after others have secured the better customers, when they are being replaced by something else. The wearer in the one case, and the client in the other, takes a different view, desiring to be in the fashion, but not in front of it. If, however, the architect waits until the fashion matures, he will not be ready for his clients until it has passed, and meanwhile they will have gone to some other architect who has been more prompt to grasp the needs of the moment.

Now, at the commencement of the second decade of the twentieth century, architects are finding themselves threatened with an entire revolution in constructional methods, which have been traditional for hundreds of years. It is a commonplace observation in the great cities that reinforced concrete has "come to stay." Its study may not be neglected safely by any one who can look forward to another ten years of life and practice. First, it must be mastered from the constructional point of view. Suitable decoration will follow, as will also a recognition of its adaptability to almost all requirements of building and the possibility of performing feats in it which were undreamt of by even our immediate predecessors. The second problem, of artistically treating the material, will probably resolve itself into one of artistically casing it while indicating the system of construction which is behind.

So much for one important fashion factor, of which every one must take account, though it is not one which will greatly affect the kind of buildings called for by the public, which rapidly changing developments of city life bring into prominence in kaleidoscopic succession. Here, at the present moment, the two prevailing fashions are for rinks and cinematograph theaters. Those who two years ago were alive to the growing popularity of the rink, and who seized their opportunity, were able to reap a considerable harvest for the moment, though more work was done in the erection of temporary buildings and the conversion of old ones to rinking purposes than in the production of new and permanent structures. The latter were contemplated, but were never carried out. The fashion proved evanescent, and architects, where they were employed, only succeeded in obtaining small commissions, and perhaps satisfactory promoters' fees, in addition, when they took up the work of company organizer.

Cinematograph theaters are still in vogue, and from their nature have involved the erection of more permanent buildings, and these of a somewhat highly decorative character, frequently more ornate than beautiful. Architects who recognized the coming of the cinematograph boom, and the possibilities which it opened up, must have done very well, even though they may not be recognized leaders in the profession. The point which we wish to make, however, is that some architects, at least, were wise enough to specialize in something which was new. Now that the boom is on, architects generally are turning their attention to buildings of this sort, only to find that nearly as many have been erected in the country as there seems to be room for at the moment, while the watchful may very well have their doubts about these theaters retaining their popularity much longer. To specialize in cinematograph theaters now would be very much like a dressmaker setting to work laboriously to learn how to cut out a hobble skirt, which it may safely be prophesied will not be fashionable next summer.

The last development in building enterprise is the temperance billiard hall—the word "temperance" being used in its very strictest sense, for, as a matter of fact, in most which have been built, so far, no provision is made for supplying any kind of refreshments whatever. Not many have been erected yet; but they are substantial buildings, attractively designed to meet the popular taste—or the lack of it—but hardly so flagrantly hideous as the cinematograph theaters. Only one company seems yet to be at work, and its capital is comparatively small; but in every case, so far, there is ample evidence that the investment will prove permanently remunerative.

In one which we call to mind there are fourteen tables. It has now been open for nearly a year, and throughout the whole of that period, from the

very commencement, every table has been occupied for an average of at least five hours per night. The charge is one shilling per hour per table, and only two attendants are necessary. It requires little calculation to show that, even after making every allowance for necessary repairs and renewals, there is left a very satisfactory dividend for the shareholders. The game of billiards, unlike rinking and cinematography, is well established in popularity. There are many districts in many towns where young men would be only too glad to play without having necessarily to go to a public house or hotel for their game.

Architects who are on the lookout for work could, at the present moment, scarcely do better than make themselves acquainted with the simple requirements of these buildings, and then take the trouble to organize local syndicates for their erection in suitable places. If each building and its fittings costs £4,000, and a company devoting itself to one county were to put up ten such from the plans of the architect who was first on the scene and took the necessary trouble to originate the scheme, it is easy to see that he would be satisfactorily rewarded for his trouble, while at the same time bringing himself in touch with persons who might afterwards employ him upon other buildings, as new fashions arise, each with its own opportunity for the successful investment of capital.

* * *

The Mineral Industry of California

THE statistics of production of structural materials in California for the year 1911 have been completed by the State Mining Bureau and show an increase of nearly $2,000,000 over the production in 1910. As usual there has been a falling off in some directions, while others show a most gratifying increase.

Following is given the production of minerals in California for 1911 listed under the general head of Structural Materials:

Cement, bbls.	6,371,369	$9,085,625	Paving Blocks, M.	4,141	$210,819
Crushed rock, tons	6,487,223	3,610,357	Sandstone, cu. ft.	255,313	127,314
Brick, M.	327,474	2,638,121	Marble, cu. ft.	20,201	54,103
Limestone, tons	516,398	452,790	Curbing, lin. ft.	54,095	11,391
Lime, bbls.	429,587	390,988	Glass Sand, tons	8,620	8,672
Granite, cu. ft.	401,209	344,351	Feldspar, tons	740	4,560
Clay, tons	224,576	252,759	Barytes, tons	309	2,207
	Total value		$17,194,057		
	Increase for 1911		$1,820,589		

The list by counties, in the order of their importance in this branch of the mineral industry is as follows:

1. Los Angeles	$2,040,314	23. Tulare	$81,000
2. Contra Costa	583,931	24. Butte	78,208
3. Riverside	582,551	25. Madera	76,340
4. Alameda	566,245	26. San Joaquin	75,160
5. San Bernardino	376,323	27. Santa Barbara	74,083
6. Fresno	347,411	28. Colusa	66,729
7. San Diego	269,488	29. Glenn	51,430
8. Placer	266,151	30. Merced	49,548
9. Santa Cruz	258,443	31. Humboldt	41,573
10. Kern	231,852	32. Monterey	37,961
11. Sacramento	209,915	33. Inyo	32,555
12. Marin	196,231	34. El Dorado	18,774
13. Sonoma	184,035	35. San Luis Obispo	18,000
14. San Mateo	178,985	36. Orange	15,605
15. Solano	144,274	37. Calaveras	11,933
16. Tuolumne	134,007	38. Ventura	10,075

17. Napa	127,428	39. Yuba	9,318
18. San Francisco	119,636	40. Siskiyou	7,179
19. San Benito	107,558	41. Imperial	7,000
20. Amador	103,895	42. Stanislaus	5,950
21. Santa Clara	96,513	43. Nevada	3,500
22. Shasta	95,511	44. Mendocino	1,600

UNAPPORTIONED:

Brick	$98,775		
Cement	$9,085,625	Glass Sand	$8,672
Feldspar	4,560	Barytes	2,207

The cement and crushed stone industries show material increase because of the large number of concrete structures being built and activity in road work, breakwater construction, etc.

Decrease in brick output may possibly be due to some extent to the substitution of cement construction for brick. It is impossible to classify the figures for the several kinds of brick manufactured, but taking the State totals for the past two years, the average price per thousand was seven per cent lower in 1911 than in 1910. Several producers remarked that their decreased production was due to falling off in price. Two or three small plants were closed entirely in 1911, and almost without exception the larger ones reported a smaller output. Over production in 1910 is partly accountable for the above.

Lime also was about seven per cent per barrel lower in price in 1911 than in the previous year, and the output fell off in a manner exactly corresponding to the decrease in brick production. Several kilns were idle that had been previously producing.

Production of limestone also shows a decided decrease, due in part to the curtailing of the copper industry, and the consequent lessened demand for limestone as flux.

Production of marble was almost exactly the same as for the previous year. Sandstone increased somewhat and the granite output fell off to about the same extent.

Paving blocks were produced to about the same number as in 1910 and brought a slightly higher price.

Production of pottery-clays fell off materially, although the opening of 1912 has seen considerable activity in the establishing of new industries along these lines, and the present year will probably show a large increase over the annual output of recent years.

* * *

The Things that Count

The harder you're thrown, the higher you bounce.
Be proud of your blackened eye.
It isn't the fact that you're whipped that counts,
But how did you fight, and why?
And though you be done near to death, what then?
If you battled the best you could,
If you played your part in the world of men,
Then the critic will call it good.
Death comes with a crawl, or comes with a pounce;
And whether he's slow or spry,
It isn't the fact that you're whipped that counts,
But how did you fight, and why?

—The Colorist.

With the Contractors

The Relation Between Architects and Builders

By Wm. M. HAGUE.*

IT is an undoubted fact, and one which is to be noted with regret, that the relations between the architects and general contractors of San Francisco are not more cordial. In nearly every other city of this size in the United States there is a better understanding existing between the two, and the business of both is thereby benefited.

There are many builders in San Francisco who are no credit to the business, whose business methods and practices can not recommend them to any right-thinking owner or architect, and if a closer understanding between the members of such an organization as composes the body of the Chapter of Architects and the General Contractors Association could be arrived at, such men could be eradicated entirely from the business without any trouble.

In many of the Eastern cities the members of the local chapter of architects and the general contractors hold meetings to discuss ways and means of improving conditions for both, and the co-operation thus established has been of great benefit by elevating the building industry to a more solid business basis and increasing the profits for both.

It is also sadly too true that there are a number of architects whose business methods and practices are no better than those of the contractors, and there is less excuse for a professional architect following crooked practices than for a builder pursuing such methods. Such a man is a menace to the legitimate architect and a prey on the business and should also be eradicated. The San Francisco Chapter of the American Institute of Architects has not yet been able to get for its members the recognition and preference to which they are entitled, insomuch as that organization includes practically all the best architects of the city. The General Contractors Association is in a somewhat similar position, and a little co-operation between the two might do much to further the interests of the members of both.

There are sadly too many architects in San Francisco who use little or no circumspection in selecting the general contractors who shall bid for the work in their offices. They know little about engineering and cost of construction, and frequently estimate to the owner a lower cost on a building than it can actually be erected for. They then go hunting for an irresponsible class of builder who will take the work at cost and trust to luck to beat the architect and owner in the construction; and they frequently go further—by working with the contractor to skin the owner, not forgetting to ask for a share of the profits thus derived. Such architects should be eliminated from the profession entirely.

The General Contractors Association has on file much valuable information regarding nearly every general contractor in San Francisco, and a case in point

*Secretary of the San Francisco General Contractors Association. The opinion expressed by Mr. Hague should not be misconstrued as the sentiments of this publication.—Ed.

of what might be accomplished by a little co-operation might perhaps be advantageously quoted here:

A certain architect had received bids for the construction of a building, and through the influence of the owner and general contractor with whom he was acquainted, had been allowed to figure the work and was the lowest bidder. The architect took the trouble to ring up the secretary of the General Contractors Association and inquired as to the standing of the low bidder, and was advised that he was not yet a member of the Association, but that he was a responsible man, one who knew his business, one to whom it would be safe for him to award the contract, also various other information as to the past experience of the contractor in question. On the strength of this report the architect awarded him the contract, and has been well satisfied with the work done on the building. In making the award the architect informed the builder that he was doing so on the strength of a recommendation from the General Contractors Association. A few days after that the contractor made application for stock in the General Contractors Association, and is today a good, staunch member of that body, and is being further elevated by the good influence being exerted by that Association on all its members. It is to be noted that all parties to this transaction were benefited by this legitimate co-operation.

General Contractors Pool Their Liability Insurance

One of the factors which has retarded the progress of San Francisco and reduced the profits of the architects and builders is the high cost of construction. Builders are continually figuring jobs which do not go ahead, and the reason for this is almost invariably that the owner can not afford to erect the building he desires owing to the fact that the cost of its construction makes it impossible for him to earn what he considers a reasonable profit on his investment. The General Contractors Association is also working on anything and everything that will tend to reduce the cost of construction. An item which in itself might appear insignificant but which has nevertheless been adding a burden on the owners' shoulders, is the cost of liability insurance under the new liability law recently enacted in this State. The result of that law was to raise the price of liability insurance more than one hundred per cent, and some contractors who had hitherto not considered it necessary to carry insurance felt themselves obliged to do so under the new law, even though the cost appeared almost prohibitive.

The contractors have been more or less at the mercy of the combination among the liability insurance companies, whereby these high rates have been maintained by the better class of companies, and recently have advanced a proposition to pool the insurance of the members with one company, provided a satisfactory low rate could be secured. The result is going to prove a considerable saving. Owing to the fact that a majority of the large general contractors belong to the Association, the various liability insurance companies have submitted bids which are less than one-half the old rate formerly being charged. The company will be selected during the month, and the members of the Association will thus save themselves considerable money during the year and be in a position to give the owner the benefit of that saving. It is doubtful whether many owners or architects realize that on a large building the cost of the liability insurance alone frequently amounts to $1,000 to $2,000, and the owner will thus get the benefit of the reduced cost from any member of the General Contractors Association. The rate is of course not applicable to outsiders; it has only been quoted as a special rate to members of the Association.

Labor Conditions

If San Francisco is to continue to retain its position as queen of the Pacific, the cost of labor and material can not be allowed to increase, and the continual demands of the labor unions for an increase in pay, reduction in hours, better working conditions, etc., must be stopped. This can only be accomplished by the co-operation of the large merchants and owners of property in the city, and if such will get together much can be done to prevent the further demands of the labor unions which, if not checked at this time, will greatly retard the city's progress during the next three years. We have all heard the story of the last straw breaking the camel's back, and that is about the situation with regard to the demands of labor in this city at this time. An open rupture should certainly be avoided if possible, and the best means towards that end is a sound business co-operation between owners, manufacturers, architects and builders and all employers of labor. This city is in a peculiar position at this time. Practically the whole Pacific Coast is running "open shop" with the exception of San Francisco, Sacramento and San Jose, and while the "open shop" condition may not be the best, it is nevertheless the solution which our sister cities of the Pacific Coast have worked out for their salvation. The unions can and should be made to realize their responsibility, and a reasonable cost of wages can only be upheld by proper and fair co-operation among all the employers. Labor is the producer of wealth, and is entitled to a fair deal, and the desired check on its demands can be accomplished without trouble if the matter is properly taken in hand and the whole situation faced with a spirit of fairness and business equity to all.

* * *

Spokane Goes Open Shop

Spokane, through its Builders' Exchange, has declared for the Open Shop. The dull times, that attack all closed shop places, affected Spokane, and forced the business men of the town to give the situation careful study. The closed shop has been prevalent for years, just as in San Francisco, and prosperity could not be cajoled within the limits of the erstwhile bustling burg.

A very careful diagnosis was made of the Spokane shops, closed under the exactions of the unions. Statistics were gathered, to show that Spokane had absolutely nothing to offer the investor or builder, as long as the unions maintained the blight of the closed shop. It was shown that cinch shop rules, and general union dictation had prevented the location of factories, and it was also shown that the dull times dated from the beginning of the cinch system of the labor trust.

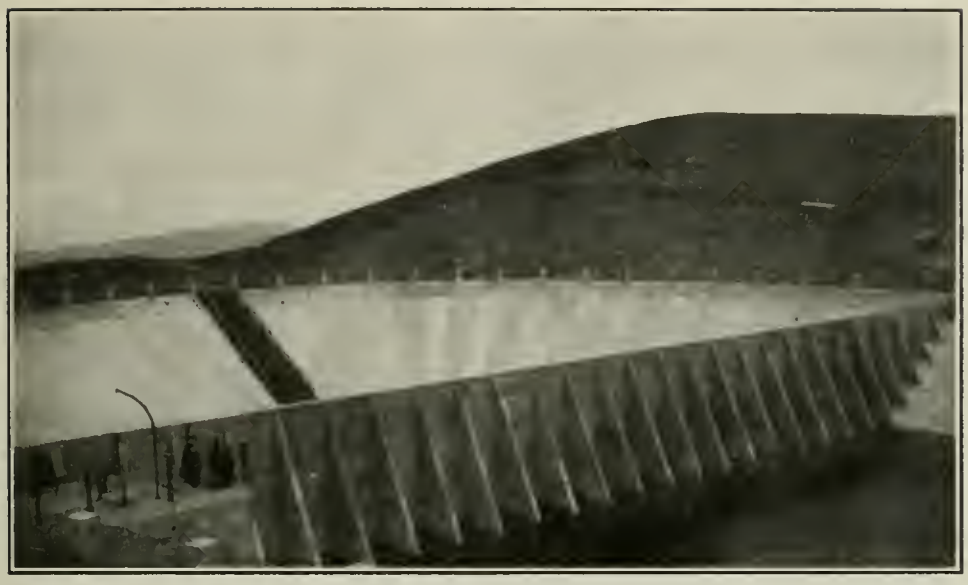
Spokane has followed in the wake of the prosperity compelling cities, such as Duluth, Buffalo, Cleveland, Detroit, and Los Angeles.

* * *

City Engineer Manson to Quit

By the unanimous vote of the San Francisco Board of Works the resignation of City Engineer Marsden Manson, has been accepted to take effect on August 31. Manson's successor will be named on September 1, and it is understood he will be Mr. O'Shaugh. No comment was made when Secretary Churchill read the resolution.

Manson's resignation followed a long series of charges made against his administration of the affairs of the city engineer's office



Twin Peaks Concrete Reservoir, San Francisco

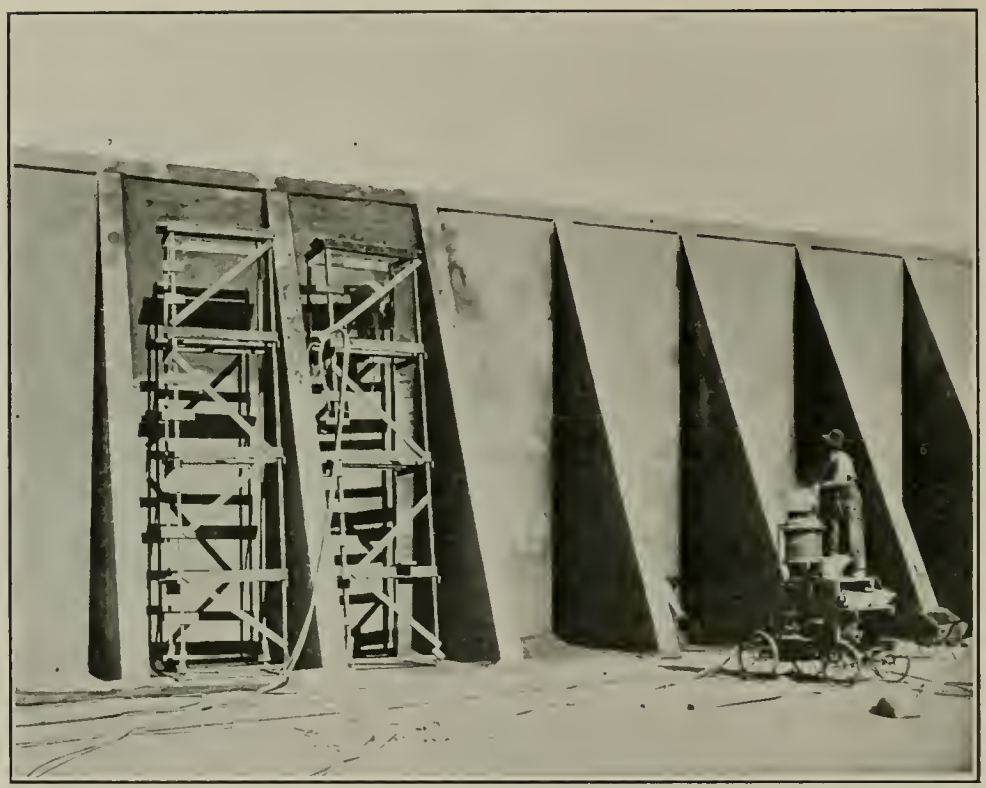
Concrete Reservoir for Fire Protection

WRITING of San Francisco's new Twin Peaks' reservoir, Cement Age gives the following interesting data:

"The reservoir is in the shape of an oval cup in an excavation on Twin Peaks and towers over 750 feet above the level of the business section of the city. It is 370 feet long by 285 feet wide and 27 feet deep. When filled it holds 11,000,000 gallons and will be used for the high-pressure system.

"An interesting feature of the tank is the buttressed division wall, dividing the tank. With this wall one-half of the tank may be emptied at any time for cleaning or repairing. The buttresses are uniform on both sides of the wall are 1 foot thick, extended out 13 feet at the base, and are 9 feet on centers. It was planned to fill one-half of the reservoir with water and hold a public reception on the day of dedication in the other side. When the reservoir began to be filled and there was about 6 feet of water in it, they found the wall leaked badly and that it would be impossible to proceed with the plans of the celebration. To waterproof this one-foot wall, the 'cement gun' was employed and with it a coating of sand and cement was applied to the wall and buttresses on both sides, averaging one-fourth inch at the top and increasing to one-half inch at the bottom. A mixture of one part of Portland cement to three parts of graded sand, with the addition of a small percentage of hydrated lime was used. The concrete was thoroughly wet down before applying the Gunite and as far as possible this was kept wet after being applied. There was, however, some difficulty owing to a shortage in the water supply and also to the high winds that prevailed the greater part of the time, which had a tendency to dry out the Gunite very rapidly.

"Three thousand two hundred square yards were covered, and the job was completed in eight days, employing one 'gun' continuously and a second 'gun' about half the time. Immediately on the completion of the work, water was



Cement Gun at Work on Twin Peaks Reservoir

pumped into one-half of the reservoir by the auxiliary pumping station at Second and Townsend Streets, at the rate of 2,000 gallons per minute until it was filled to a depth of 25 feet 6 inches. At the end of twenty-four hours, a slight seepage of moisture was indicated by the appearance of a few damp spots on the wall and at the junction of the mortar coating and the floor. In forty-eight hours this slight seepage ceased and the damp spots disappeared. The result indicates that sand and cement applied by compressed air as is done with the cement gun, fills the voids and makes a concrete so dense as to be perfectly waterproof.

"On Sunday, May 12, the reservoir well decorated with flags and bunting was dedicated, and while one-half contained 25 feet 6 inches of water, the other half was used as an auditorium in which to hold the exercises. The waterproofing work was done by The Lilley & Thurston Company, of San Francisco, who are agents for the Cement Gun in Northern California."

* * *

The Fitness of Things

"The expression is rather stern," the photographer said, pausing a moment before exposing the plate. "Can't you soften your features a little?"

"No, sir," frowningly answered the unpopular office-holder, "this picture is to illustrate a newspaper article headed 'Mr. Squallinger Resigns His Job in Disgust.'"

Among the Architects

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Missouri State Capitol Competition

The preliminary competition for the proposed Missouri State Capitol has been decided. the ten competitors selected to enter the final competition being as follows:

Arnold W. Brunner, New York City.
Eckel & Aldrich, St. Joseph, Mo.
Freelander & Seymour, Jr., New York.
Cass Gilbert. New York.
Theo. C. Link & Son, St. Louis.
Peck, Cook & Welch, New York.
Rankin, Kellogg & Crane, Philadelphia.
James Gamble Rogers, New York.
Tracy & Swartwout, New York.
Trowbridge & Livingston, New York.

The jury of selection was composed of John Van Brunt, Kansas City, Mo.; W. B. Mundie, Chicago, Ill., and H. V. B. Magonigle, New York.

The final competition will be decided on September 16, when a newly selected jury will make the award.

Pittsburgh City Hall Competition

Press dispatches state that Mr. Cass Gilbert has been appointed consulting architect to the County Commissioners and City Council of Pittsburgh, Pa., during the progress of the competition for the proposed new county building and city hall.

This competition, it is further stated, will be limited to architects of Allegheny County, Pa., who are bona fide residents of the county and who have been since January 1, 1912, and who are now doing business in the city of Pittsburgh.

The proposed building is to cost $3,000,000, exclusive of furnishings.

Architectural Club Jinks

The San Francisco Architectural club held a Bohemian night recently, at their clubrooms, 126 Post street. The program of entertainment was as follows: E. Mosher, tenor solo; Clive Atkinson, joshes and jokes; D. Whiteside, pianologue; T. C. McMahon and B. F. Walters, duet of songs; original monologue, Howard Jensen; cartoon display of members of the club, J. W. Bayley, Jr. and William Merchant. The committee having charge of the arrangements for the evening was as follows: John Beuttler, Otto R. Schrader, R. Brandlein, William Garren and James A. Magee.

Architect's Home Robbed

The residence of Lewis P. Hobart, architect and clubman of Hillsborough, was entered by burglars twice last month. Articles valued at several hundred dollars were taken away from the dining-room and the main floor of the house. The family and the servants had retired The first burglary took place a few nights previous. After that the Hobarts sent their valuable jewels and plate to San Francisco vaults.

Chapter Communications

At the June meeting of San Francisco Chapter, A. I. A. tbe followng communications were read and ordered placed on file: Night letter from Mr. Glenn Brown, Secy. A. I. A. requesting the Chapter's immediate action against the repeal of the Tarsney Act; communication from Mr. Edgar M. Lazarus, regarding reinstatement in the S. F. Chapter; from Mr. Bloom, Secretary to Mr. Willis Polk, letter enclosing communications from Mr. D. H. Burnham in regard to the Francis Davis Millet Memorial, and from Mr. M. A. Vinson relative to the holding of an architectural exhibition in San Francisco; from Mr. A. F. Rosenheim, Pres. and Mr. Myron Hunt, Treas. of the A. L. P. C., regardng the Chapter's indebtedness to the League; from the American Federation of Art, asking the Chapter's aid in financing the Federation; from the Michigan Chapter, A. I. A., copy of its minutes of May 14, 1912 meeting; and 1912 Year Book from the Boston Society of Architects.

The Tarsney Act

San Francisco Chapter, A. I. A., has sent a communication to Glenn Brown, Secretary of the National Institute at Washington, recommending that Congress takes no further action toward repealing the Tarsney Act and that in the reconsideration of the present action, it call the A. I. A. into consultation, to find out if the Tarsney Act could be improved, towards the betterment of Architecture and the efficiency of government work; and also that the Chapter transmit immediate word to Glenn Brown and California's representatives in Congress.

D. H. Burnham Resolutions

The following resolutions on the death of Mr. Daniel H. Burnham, were submitted by Mr. F. T. Shea, and adopted by San Francisco Chapter at its June meeting.

"Whereas, the profession of Architecture of this country has sustained an irreparable loss in the departure from this life, with suddenness and serious effect of its foremost and most beloved practitioner, Mr. Daniel H. Burnham, of Chicago,

And Whereas, Mr. Burnham, through his talent and genius, not only as an architect mastering the most monumental architectural problems of our times, but an invincible business man of superb qualifications, has caused his name to stand out, singly and alone, in a field of architectural exploitations; and

Whereas, through his splendid and wonderful achievements, he has elevated the profession of Architecture, as no other American has; and

Whereas, his life, professional success and public spirit has been such that all may attempt to imitate, but none hope to excel;

Resolved: That when this meeting adjourns this evening, it shall adjourn out of respect to the memory of that great American and darling fellow, the beloved Mr. Daniel H. Burnham.

Elks Building for Richmond

Architect James Narbitt has been selected to prepare plans for a $50,000 Elks building to be erected by Richmond Lodge, No. 1251

Giant Flag Pole

The huge flag pole presented to the Panama-Pacific International Exposition by the citizens of Astoria, reached San Francisco, in one of the giant rafts of the Hammond Lumber Company, and has been towed to the Exposition site at Harbor View. It was sent by Mayor Henderson of Astoria, as that city's contribution to the wonderful Exposition that is to be held here in 1915. The pole was originally intended for the Astoria Centennial Celebration, but it was so long and heavy that it was impossible to raise it. The dimensions of the flagpole as given by an expert timber scaler are as follows: "Douglas Fir, a perfect piece of timber; base 56 inches; top 23 inches; estimated weight 93,061 pounds. Cubic contents 1958.52 cubic feet; contains 23,515.46 solid lumber feet; length over all 246 feet. The special flag, which is to be flown from this flag-pole, is to be furnished by the citizens of Astoria. It is planned to hold appropriate ceremonies when the pole is raised and Old Glory is unfurled from its lofty peak.

Mr. Howard's Salary

Auditor Thomas F. Boyle of San Francisco, has held up three salary warrants aggregating $2,000 drawn in favor of John Galen Howard, the architect, and has refused to audit them until he had received an opinion from City Attorney Percy V. Long. Boyle took the position that Howard is not a resident of the city and county of San Francisco and that therefore he could not draw a salary from the city.

Howard was employed by Mayor Rolph and the Board of Supervisors to act with John Reid and F. H. Meyer as an advisory board to pass upon the plans for the new city hall.

City Attorney, Percy V. Long, in speaking of the matter, said:

"Auditor Boyle is wrong in his belief that Mr. Howard is drawing a salary. We went over this matter very carefully before these men were employed and fixed Mr. Howard's compensation on a per diem basis, the same as in the cases of the other experts. I believe in his case that it was placed at $25 a day and by allowing it to run several months an aggregate sum could be allowed him in proportion to the work he has done. There is nothing irregular in the matter and I am sure it will readily straighten itself out."

The July Number

The Architect and Engineer has received some very pleasant words from newspapers and readers in praise of the July number which showed the prize winning designs of the San Francisco city hall. The demand for this splendid number exceeded all expectations of the publishers, calls for extra copies coming from most every point of the globe.

Exposition Directors Seek Auditorium Plans

The following resolutions pertaining to the erection of an auditorium in the Civic Center on land to be supplied by the city have been adopted by the board of directors of Panama-Pacific International Exposition:

Whereas, The Panama-Pacific International Exposition Company has set aside $1,000,000 for the erection of a monumental auditorium in the Civic Center on land to be supplied by the City and County of San Francisco,

Whereas, It is desired that plans for this auditorium shall be prepared immediately so that the building may be completed at the earliest possible date.

Whereas, A harmonious program and plan of action has been agreed upon by the building and grounds committee of the Panama-Pacific International Exposition Company, and the building and exposition committees of the Board of Supervisors; be it

Resolved, That the Panama-Pacific International Exposition Company hereby requests the City of San Francisco to designate its advisory board of architects as the architects to prepare plans for said auditorium, which plans shall be for a building that will harmonize with all other Civic Center buildings and in the preparation of these plans the advisory board of architects or architects in charge shall be advised and instructed by the Panama-Pacific International Exposition Company as to the interior arrangement and space allotments in the said auditorium. The draughting expense of said board of architects in the preparation of said plans and specifications to be borne by the Panama-Pacific International Exposition Company out of the $1,000,000 set aside by the Exposition Company for the purpose of erecting the auditorium, it being understood that the expense of such architects shall not exceed $40,000; be it further

Resolved, That when the plans for the auditorium shall have been aproved by the Board of Supervisors of the City and County of San Francisco and the Panama-Pacific International Exposition Company, contracts for the construction of said auditorium shall be let by the Exposition Company and the work of construction conducted by the Panama-Pacific International Exposition Company.

The resolution was submitted to the Exposition board by the Building and Grounds committee of the Exposition and a copy of the same ordered immediately transmitted to the Board of Supervisors.

There appears to be considerable opposition to giving the designing of this and other Civic Center buildings to the Commission. Many architects think the work should be done by competition, the same as the city hall.

He Knew His Rights

"You are a designing man," said the fair maiden to her architect lover, "and you are building too much on the slight encouragement I have given you, but your plans cannot be carried out."

"Then" replied the suitor, as he planted a kiss on her plastic brow, "I will collect my fee for preliminaries."

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PLUMBING LAW DISREGARDED

It appears from reliable reports at hand that some of the architects of San Francisco are not living up to the new Plumbing Law. Our attention has been drawn to at least one flagrant violation of Section 204-5, in a well known down town hotel. The utter absence of the required and very necessary ventilating ducts in the toilet rooms of this hostelry may have been the fault of either the architect or the contractor of the building, or both, but there appears to be no excuse for the omission, and if the city authorities do their duty, there will be some action in the matter immediately. Here is a copy of the law that is being disregarded:

Each and ev ry compartment wherein a bath, water closet, urinal or slop or scullery sink is situated, shall be ventilated by means of a window opening directly to the external atmosphere or by means of an air shaft having an area of at least two square feet. This air shaft shall continue of undiminished size to the roof, and at this point its opening shall equal in area not less than that of the shaft.

Sec. 205. No air shaft or window ventilating either a bath, water closet, urinal, slop or scullery sink compartment, shall discharge into, nor ventilate any other compartment whatsoever.

NEW USE FOR VACUUM CLEANERS

The vacuum cleaning process has been applied to many uses, but for novelty none of them will compare with the use that has been made of it in California. In the vicinity of Newman, an energetic young man who believed that vacuum carpet cleaners could be sold in the country as well as in the city is responsible for the death of millions of grasshoppers in that city and many alfalfa ranches whose parlor floors boast no carpets, have become his patrons. Noticing the desperate expedients made to rid gardens of grasshoppers he mounted a cleaner on a light sled and pushed it before him on the alfalfa. The hoppers jumped before it as it reached them and were drawn by

the suction into the machine. The farmers have added to the economic advantages of the system by drying the hoppers and sacking them for chicken feed.

Observations

By BILL WISE

Sub-Contractors May Organize

Following a recent organization of the California Building Contractors' Association, a movement has been started in San Francisco to form a central body of all the local sub-contractors doing specialized work in the building lines. The standing of the sub-contractor, as opposed to the general contractor, is a matter of animated discussion on both public and private work. A leading cause of the trouble is the number of irresponsible general contractors operating in San Francisco and their tendency to let sub-contracts to outside firms.

* * *

"Zaccheus, Come Down!"

The golden rule is a good guide for business as well as choir practice, and the policy of appropriating The Architect and Engineer's advance Building Reports by a "weak and crring" hrother seems to us to fall only a little short of "Larsony."

* * *

Healy-Tibbetts Save Money

The Public Works Commission has decided that the city shall stand three-fourths of the cost of repairing the leaky Twin Peaks reservoir, and the other quarter is assessed to the contractors, Healy-Tibbetts Co. Accordingly, this firm is in receipt of many congratulations from those who feared, from an inspection of the condemned work, that they might suffer a more severe penalty.

* * *

Exposition Progress

President Taft has detailed an U. S. Army officer to act as military escort and attache to President C. C. Moore, of the Panama-Pacific Exposition. This has caused quite a flutter among San-Franciscans who are at a loss as to the proper dress to wear when seeking an interview. In foreign countries full dress is *en regle*, when audiences are granted by potentates, even in day time ceremonials—but the spectacle of "Andy" Gallagher, "Mikey" Casey and others lining up at noonday in "claw hammer" coats, may, we fear, cause a commotion in political circles. The penalties for *lese majeste* will, we presume, be very severe and we advise extreme punctiliousness in this matter.

The State Buildings For Panama-Pacific Exposition

The local contractors who are counting upon the various State Buildings as part of their prospective work may be disappointed. Experience has shown that these State Buildings are usually awarded to some favored son in their own boundaries who establishes offices in the Exposition City and becomes a competitor for other work as well. We may therefore expect quite an influx of General Contractors who will make things lively for the local bunch.

* * *

Sidewalk Lights

This industry seems to be imperiled in San Francisco by the proposed ordinance taxing property for tunneled sidewalk space. The land donations made for new streets had probably no intent that they should cover any purposes but those of pedestrians and traffic uses but City Attorney Long seems to think that the City has acquired full title and should, like any other landlord, make all it can out of its holdings. It behooves property owners (as well as our soporific friends, Jackson, McGuigan, Janson & Co.) to "look lively" after their own interests and oppose this measure.

* * *

Greater San Francisco

The Petitions having been all closed (with a margin of 8000 to spare over the required 30,000 names) it is but reasonable to suppose that there will be a lively contention on over the question of consolidation. Whether it is better for Oakland and outlying towns to continue as cities instead of becoming Boroughs will be discussed from all points of view. With Greater Los Angeles now under way, the Bay Cities will do well to consider carefully before yielding first place in population to its neighbor and lively rival.

* * *

Interior Work

At a recent Architectural Lunch, the "Seating List" was blue-printed and a copy handed to each guest. The menu was as follows:

SOUP
H'oister
FISH
Crushed Rock Cod
Sand Dabs
ROASTS
Pig Iron
SALADS
Spring Bed Lettuce
DESSERT
Brick Ice Cream
Marble Cake

The beverages were referred to as "Interior Decoration," "Vacuum Cleaners," "Liquid Cements," "Elevators," etc.

State, County and Municipal Engineering

Good Roads—Water—Sewers—Bridges—Fire Protection

Cracks in Concrete

By P. A. Leslie

PROBABLY there is not a building material in the market that has been more generally discussed or more severely criticised than concrete, particularly reinforced. It has entered into all engineering projects to a greater or less degree and its uses are continually increasing.

Concrete has, without doubt, come to stay, it has more good qualities than any other one building material, but not the combined merits of them all. Right here is the source of its hardest knocks. Friends in their enthusiam have used it without due consideration of its peculiarities, thus a great many so-called failures, giving critics the desired opportunity to condemn. At that, about all the criticism possible seemed to be of the method used rather than the material. Again many of the critics have greater interests financially in other materials. Probably the greatest fault of concrete is its cracking due to expansion and contraction. Engineers seem to lose sight of this important fact, or perhaps we should say do not consider these cracks seriously enough, depending on some way of covering up, rather than controlling them.

It has been conclusively proven concrete will expand and contract for an indefinite period of time and if monolithic construction is attempted, cracks will develop, which are bound to be of a more or less serious nature. However lucid an engineer may be in explaining how they happened, one feels there is something wrong somewhere. It does not give one the confidence in concrete that is due. Some engineers now recognize this and are designing not to prevent, but to control them. Only by bringing concrete under subjection in this way the most perfect results can be obtained. The natural expansion and contraction having been taken care of by the use of expansion joints, there is little to fear of other cracks developing in (correctly mixed and well placed) concrete. The only problem now confronting us is the proper treatment of these joints. This solved, a long step has been taken toward bringing concrete into its own.

Architects and engineers have been looking for a material to fill these joints, something that would not run under the heat of the sun, be water-tight and yet permit the joints to expand and contract. Of the various materials used asphalt seems nearer meeting the requirements, but so far without any marked degree of success, in many cases a complete failure. Asphalt has little if any adhesion to concrete. Thus, a very soft grade is used, which will run at a comparatively low temperature, making it impossible for any but level joints, even these are uncertain.

Being familiar with a bituminous enamel known as Biturine and knowing is to be an excellent article in other lies, it occured to the writer to investigate it for expansion joints in concrete. With this in view experiments and tests were conducted, the results and revelations a great surprise.

Several expansion joints in concrete were made and filled with this enamel, having a cross section of one square inch and one-quarter inch wide. These under tensile stress developed an ultimate strength of 432 pounds (practically that of concrete itself). At this point the joint parted. The break occurred in the Biturine without the slightest indication of its leaving the concrete—it also showed the joint stretched 1-16 of an inch giving the material an elongation of about 25%.

These tests show us this material will fully meet all requirements called for in expansion joints, resisting more pressure than it will probably be ever subjected to. It will not run under the heat of the sun and yet remain flexible enough to permit the ordinary movement of concrete. We have now a system of concrete roofs that promises great possibilities, instead of depending on a covering that is entirely foreign to concrete and subject to disintegration in a few years and having at hand a material so well adapted to this work, it is now up to the architects to insist on concrete performing its full duty. If we are going to have concrete construction be consistent all the way and have all parts of the structure durable as the concrete itself.

The Renewal of a Bridge Floor

The work of renewing a bridge floor over the Connecticut River in Springfield, Mass., is dealt with in the annual report for 1911 of Mr. Charles M. Slocum. The South End Bridge floor system was examined early in the summer season, and it was found that the kyanized spruce under-flooring, floor joists and under-floor, as laid in 1893, were so unsound that immediate steps should be taken looking to removal of the entire flooring. The wearing surface of 2-in. untreated spruce was also so worn that its removal was necessary. Creosoted short-leaf yellow pine, was substituted for all the old timber; the under-flooring as finally used consisted of 2¾ in. yellow pine laid on floor joists of same material.

The new wearing surface consists of creosot d short-leaf yellow pine paving blocks 2¾ in. in depth. The blocks were laid directly on the under-flooring, which was laid close, and the joints filled with a bituminous joint filler, and a thin coating of trap rock screenings spread on top, while the bitumen was warm so as to unite with it. The flooring as relaid presents a uniform surface convenient for passing vehicles, according to Mr. Slocum, and it is believed that the best results have been secured for economy and satisfactory use, although the cost was considerably more than would have resulted from the use of ordinary flooring of untreated timber. It is believed that the creosoting process will serve to preserve the timber for twenty-five or thirty years without appreciable decay, and the wearing surface, when badly worn can be renewed without removal of the under-flooring.

Pacific Highway Convention

The Third International Pacific Highway Convention was held at the St. Francis hotel, San Francisco, August 5, 6 and 7. The attendance was not as large as expected, due probably to the fact that the chief advertising for the gathering was done in Seattle and vicinity. There were a great many people in San Francisco and the Bay cities who would have attended had they been informed of the time and place. Then again, the convention would have been much more successful had there been a display or exhibition of implements, etc., used in good road making. Most of the delegates came in search of information. A trades' exhibit would have given them the desired enlightenment. The only display at the meeting was a handful of paving brick, exhibited by a Northwest concern.

The program included an address by John Brisbane Walker, director of Exploitation of the Panama-Pacific Exposition Committee; an address by A. B. Fletcher which is printed in full elsewhere in this issue, and an address by Hon. Thos. Taylor, Minister of Public Works of British Columbia; and W. J. Kerr, President of the California State Automobile Association.

Master Plumbers Meet

The California State Association of Master Plumbers held its Eleventh Convention at Tahoe Tavern, Lake Tahoe; opening at 10 A. M. June 24th and continuing through the 25th and 26th.

State President Frank J. Klimm submitted his annual report containing several matters that were referred to the Committee on Resolutions, and which were acted upon by the convention.

The reports of the president, treasurer, and the secretary demonstrated that the State Association is in a very satisfactory condition and prosperous.

Responding to a communication addressed to the convention by the Secretary of the State Association of Hardware Dealers, the convention appointed a committee consisting of Messrs. Frank J. Klimm, John L. E. Firmin and A. J. McCarl for the purpose of conferring with representatives of the Hardware Dealers Association upon matters of mutual interest and welfare: The Committee to report its finding to the State Executive Board, so that the Board shall be in a position to make recommendations to the State membership.

The matter of affiliation with the State Association of Contractors and Dealers, both as locals and otherwise, received considerable attention: Numerons locals identified with the Master Plumbers Association now being affiliated with the Contractors and Dealers Association; and for the purpose of bringing about a comprehensive and intelligent line of action, the Master Plumbers' State Executive Board was instructed to take the subject matter actively in hand.

The convention expressed strong disapproval of the prevailing custom whereby the jobbers and manufacturers shift the expense attached to replacing imperfect fixtures upon the Master Plumber; the convention taking the position that, it is not sufficient that the proven imperfect fixtures shall be substituted only, and that the contingent expense attached to replacing shall be paid by the plumber. It is the opinion that since there are manufacturers and jobbers whose guarantee covers all that is asked, that others can and ought to do likewise.

The custom of certain architects drawing up contracts by the terms of which the contracting master plumber is required to give a five years guarantee upon all work, was emphatically disapproved of by the convention as being unjust, for several reasons, one of the more prominent being that the master plumber

cannot himself obtain a guarantee for any such extended period; therefore, the convention condemned the practice and urged its members to refuse any contracts demanding more than one year guarantee.

The question of "Credit System" annually becomes more prominent before the convention; and for the purpose of arriving at a just and equitable reform by which recklessness and dishonest practices shall be eliminated, the subject matter of credits, terms, cash discounts, was referred to the State Executive Board to confer with those giving and carrying credit accounts.

The Master Plumbers State Association has been energetically carrying out an educational campaign among its members and the public, to the end of cultivating a public sentiment which will realize the moral and sanitary importance of public conveniences, or comfort stations, and sanitary drinking fountains; the reports submitted showed very gratifying results.

Numerous other matters were taken up by the convention, but they were not of general interest.

Having concluded its general affairs the convention elected the below mentioned gentlemen to serve as State Officers for the ensuing term: After empowering the State Executive Board to name the time and place for the next convention, the convention adjourned sini die.

The State Executive Board is as follows:

President Edward W. Crowell, Los Angeles; Vice-President John Cahill, Sacramento; Treasurer Wm. F. Wilson, San Francisco; Secretary John L. E. Firmin, San Francisco; Thomas Haverty, Los Angeles; William Rowe, Fresno; Fredericks & Heilbron, San Diego; Frank J. Klimm, San Francisco, Past State President.

National State Delegates: Edward W. Crowell, Los Angeles; Thomas Haverty, Los Angeles; Alexander Coleman, San Francisco.

Assistant State Secretaries: Vincent W. Guercio, Los Angeles; A. J. McCarl, Oakland.

World's Fair Construction Notes

In a report submitted by the Building and Grounds Committee to the Board of Directors of the Exposition, it was stated that the drawings for the Service Building, one of the first structures to be erected on the Exposition site were practically completed, and that studies are under way for the grouping of minor buildings about the Fillmore street entrance and the entrance to the Amusement Concessions.

The report further showed that the Engineering Department is working on plans for the operation of the sewer system, which is to drain the Exhibit Palaces and that these plans were three-fourths completed.

Working plans for the fresh-water system and the fire-protection system are under way.

The work of constructing a sea-wall has been completed and the contractors have about completed the fill they have been making between Buchanan and Webster streets. Bids have been called for the filling in of lands in the Presidio and adjacent thereto, and these are to be received next Friday. Bids for the construction of a fence about the Exposition grounds are to be received the same day.

Up to the present day seventy-five buildings have been moved from the Exposition site at Harbor View. Laborers under the direction of John McLaren, Landscape Engineer of the Exposition are now preparing trees for planting and the water supply system for the nursery has been installed.

Plans and specifications are also finished for the Service Building which will be the first to be erected on the Exposition Grounds. This structure will cover an area of 150 feet by 200 feet, and will be two stories in height. This building will house the Department of Works, the pre-Exposition Hospital and the pre-Exposition Department of Admissions. It will cost in the neighborhood of $60,000.00 and is to be constructed immediately.

Chief Croker on Fireproof Materials

Former Fire Chief Croker, of New York City, whose point of view is naturally that of the man trained to fight fire, is quoted as having said:

"If I had my way about it I would not permit a piece of wood, even the size of a lead pencil, to be used in the construction or finish of any building in the United States exceeding a ground area of 25 x 50 feet or three stories in height. If there was still an absolute necessity for its use, if it could not be replaced with steel, as it has been in many modern constructions, it would then be well to attempt to conceive of something better. Wooden floors, wooden window frames, doors and casing burn and help other things to burn. Everything that is made of wood burns and helps the fire to spread. Eliminate wood, remove the cause, and you have precluded the possibility of fire."

POSITION WANTED—An experienced specification writer would like a position in San Francisco or any other Pacific Coast City. First class references. Address M., care Architect and Engineer, San Francisco.

HEATING AND LIGHTING

Plumbing and Electrical Work

Warming and Ventilating the Home

By J. B. Outland.*

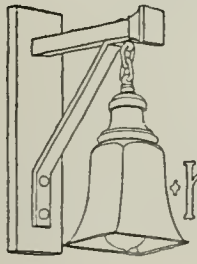
NO factor in home building enters so largely into its comforts as does the question of warmth. In the first place the air must be pure and wholesome, otherwise there will be little comfort for the occupants of the house, and good sanitation will be sorely lacking. The walls, floors and roof are all constructed with a view to rendering them as nearly air tight as possible. The windows and doors are all fitted with the same end in view. In summer you can open windows and doors for ventilation, because the house can be screened against insects, and shaded so as to exclude extreme warmth, thus obtaining a cooled and healthful atmosphere, but in winter when you must practically seal the house some other means of ventilation will have to be provided if you are to be comfortably and healthy. In winter, some means of warming the home is needed whether it is the mansion or the cottage, and in no other way can warmth and ventilation both be had as in a combination of the two. A change in temperature causes air to be set in motion and as the circulation of air is necessary to ventilation, it needs no further argument in favor of the combination. There is nothing so vitally necessary to health as fresh air, and it is evident that this must come from the outside of the building and that it must be constantly renewed. It is evident, therefore, that this air must be warmed so as to heat as well as ventilate the house. This leaves but one way in which to accomplish this result and that is by the indirect method of heating.

Stoves, steam or hot water radiators or coils are absolutely unsanitary. The stove has some slight advantage over the radiator, because it will require some fresh air for combustion drawn in through cracks around windows and doors and the occupants will get the benefit of some of this. With direct radiation the air in the room is simply heated and ascends to the ceiling and as it cools, falls to the floor to be again heated over the radiator, leaving the occupants of the room to use the same air over and over.

Endless citations could be made from the most eminent authorities, condemning any system of heating by means of direct radiation.

Architects of renown have given this matter their best thought and investigation. Physicians have advocated and

*Pacific Coast Representative, Lennox Furnace Company.



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preached the doctrine of Fresh Air until today the question is coming to be one of recognized importance in home planning and building. The element of cost is the one thing that determines many questions with regards to the character of the house and as we deem heat and ventilation a necessary part of it, the writer will endeavor to present facts to show that the warm air furnace, properly installed, is the best medium with which to obtain these desired results.

With the full intent to render to steam and hot water, what is due them as a heating system, we will again refer to the indirect system of warming. This means any heated surface which will not give off gases and over which air can be passed and warmed and then brought into the rooms of the building without being super-heated. This can be accomplished with either steam-hot water or the warm air furnace. An indirect system of either steam or hot water is very expensive to install and also requires more radiation than does a direct system where the radiators are placed in the rooms and no ventilation is provided for. Such systems are usually beyond the reach of the home builder. We wish to say, however, that an indirect system of steam or of hot water is absolutely all right from a sanitary standpoint. Contrary to the prevailing opinion, a warm air furnace of the very best make and of ample size, including a ventilating system, will cost about one half of what a steam or water plant would cost. Another thing to consider is the cost of operation, which is lower for the furnace than is any other system in a climate such as we have on the Pacific Coast. This for the reason that with steam or water, it takes from 30 minutes to one hour to get heat while with the furnace, immediate results can be had. You can go into the basement and start a fire in the furnace and by the time you get upstairs you will have warm air coming from the registers. This is a decided advantage, where you only want heat for perhaps an hour or so in the morning or evening.

When planning your house, look up the question as you would that of plumbing fixtures, decorations or furnishings. Health and utility should be more considered than appearance.

Consult your architect fully on this question and see to it that he makes adequate provision for heating and ventilating ducts. You will find the modern architect more than willing to help you in this way. Most home builders have a certain amount of money to spend in building the house and in the employment of an architect insist that he give them appearance first of all. The architect does the best he can for the money and very often has to sacrifice what he would deem essential or else lose the work. Give the architect a chance.

I firmly believe if the question of ventilation, along with that of warmth, was considered as it should be, by architects and owners, it would do more to conserve the health of that portion of our population that dwell in crowded centers, than all the pure food laws that have been enacted.

You may live three or more weeks without food, three or more days without water, but only three minutes without air. When this commodity is so cheap. Why do you starve yourselves for lack of it in its purity?

Manufacturers of warm air furnaces have been every much to blame in the past for all the knocks that have been given warm air furnace heating. They have not insisted that their dealers understand anything about proper installation, neither have they furnished the architects with any reliable data for specifications and figuring, as have the steam and hot water manufacturers. Up to within the last few years the furnace was practically a cast iron stove with a casing around it. Simply the by-product of stove foundries where such iron as was not suitable for stove plates was

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made into furnaces and other heavy castings, and in disposing of same, it was a question of getting rid of tonnage to any one that would buy. The result was the doing of much harm to what is the best and cheapest warming medium for the home or other buildings where their use is practical.

Happily, this condition is being changed by the manufacturers. They are now, through organization, doing their best to educate the public, as well as the dealer and to encourage the architect by assuring him good service. The quality and construction of the warm air furnace have been vastly improved and with it the demand has increased until there are many large factories in the United States that manufacture furnaces exclusively. Steel has largely replaced cast iron and is now recognized as the best material for furnace construction. This for the reason that it can be made absolutely gas proof without the use of cements or packed joints and also for the reason that it is a much quicker heating medium. In the selection of a furnace, the one figuring it should know what the average air travel is under gravity conditions. Take each individual room, its location and its uses into consideration and determine the volume of air that is required to heat and ventilate same. From this the size of the duct necessary to carry the volume of air is arrived at. The combined area of the ducts to the different rooms being estimated, will give the size of the furnace required and which should have a free area through it, casing at least 20% greater than the combined area of the warm air ducts that are taken from the furnace. This will insure all the warm air ducts being kept full of air and at the same time will reduce the velocity of air through the casing around the furnace, allowing proper time for the air to be warmed. The fresh air supply is one that needs particular attention and in no case should it be less in volume than that which is required to be taken from or through the furnace. Air has, of course, to be brought into the bottom of the furnace and there are two ways of doing this. One is by having a pit under the furnace with the air duct leading into it, and the other is by means of a shoe made of galvanized iron surrounding the base of the furnace and with the air supply leading into it. It is often not desirable to construct a pit for the furnace and if properly constructed, the shoe is just as good as the pit. The writer has seen hundreds of otherwise fairly good jobs that were spoiled because of the wrong construction of fresh air shoe and its inlet, and for this reason wishes to lay especial stress on this most important point.

As it is not always possible in city houses to get the fresh air supply from the proper direction, it is a good plan to provide a fresh air room, made of T. and G. lumber, usually about 3' x 4' in size and the full height of the basement. Screens made of cheese cloth on light wood frames should be provided in this room. This will avoid any unpleasant drafts, will keep out dirt and furnish a better supply of air than will a direct opening from the outside. It is also a very desirable feature to have from the main hallway of the house itself, a return air duct of full capacity. This

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should be connected into either the fresh air room or the air duct before it enters the shoe and with a damper that will close one and open the other. In this way you cannot close the air from the furnace, but air can be admitted from either inside or outside. The reason for advising the inside or return circulation, is that when first starting the fire in the furnace the circulation of the air is much more rapid and means a saving of fuel and time in the warming of the house. Just as soon as the house has become warmed, the damper should be changed so as to admit the air from the outside.

In a future article, we will take up the question of ventilation of the home, used in connection with the warm air furnace.

The Electrical Blue Book

The 1912 Electrical Blue Book is a handsome publication of 206 pages, containing a comprehensive exhibit of officially approved electrical supplies, to which is added an illustrated list of other representative lines of electrical material. A feature which makes this book especially valuable to every user of electrical material is the National Electrical Code, the rules and requirements of the National Board of Fire Underwriters for electrical wiring and apparatus as recommended by the National Fire Protection Association. The Code rules are explained in detail and the many illustrations bring out in a most understandable manner the correct interpretation of the installation rules. A complete index makes each rule and section easily discovered. The list of approved fittings is unusually comprehensive and is brought up to May 1, 1912. The illustrated exhibits of the manufacturers of electrical material, together with the other essentially valuable contents of this publication, make it of unique value to the buyer of electrical apparatus and supplies. The book measures 9 by 12

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inches, is bound in substantial stiff cloth covers and will undoubtedly be preserved and used as a convenient book of reference by all recipients. Each book is carefully packed in a strong paper carton. Supplied by the Electrical Review Publishing Company, Chicago, at $2.00 per copy.

Johnson Service the Best

The Johnson Service Company is now represented in San Francisco by A. G. Caldwell with offices in the Monadnock building. Most architects, especially those who do very much school designing, are familiar with the Johnson system of temperature regulation. It is known as the Humidostat for humidity control, and consists of automatic devices for regulating the temperature of air, water and other mediums, through its application to all known forms of heating and cooling apparatus. While especially adapted to regulating temperature of schools, office buildings, public buildings and residences, it is equally useful in connection with manufacturing processes, where uniformity of temperature is an important factor in quality and economy.

The effort toward improvement has never stopped and each year new devices have been invented. Special forms of thermostats have been perfected for every practical purpose, and today the Johnson System remains the standard of the world for automatic heat regulation.

The company's main office and factory are located in Milwaukee with branches in all the principal cities of the United States, Canada and Europe. These branches are in charge of practical engineers, whose services are at the disposal of architects and builders.

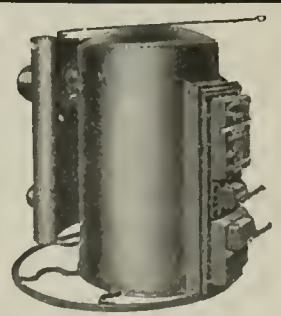
Electrical Contractors Organize

At the convention of the California Electrical Contractors, a new organization was formed known as the California Association of Electrical Inspectors, a branch of the national association. W. A. Spencer of San Jose, was elected president; Edward W. Jewell, city electrician of San Diego, secretary, and P. A. Anderson, chief electrical inspector of Oakland, treasurer. E. N. Beecher, chief electrical inspector of San Diego, and C. W. Mitchell of the Board of Fire Underwriters of the Pacific, were named as a committee to forward further organization to the time of the next convention.

The objects of the new organization are to promote co-operation between inspectors and contractors and to make inspection uniform.

A Prominent Architect Says:

"Vacuum Cleaning is on my list as one of the things to be considered in every operation. I would no more think of omitting vacuum cleaning, than of omitting heating, lighting or ventilation."



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By the Way

Some Industrial Information Worth the While

Gunite is in Demand

Reports from the Lilley & Thurston Company indicate a steady demand for the cement gun which has been found a profitable substitute for the old-time method of hand application of cement finish. The gun process is not only less expensive but more thorough in application, and where a smooth cement finish is desired the gun will do the work, and insure against possible cracking. Gunite will be used on the new San Francisco Armory, from plans by State Engineer McClure, and the Geary Street Municipal Car Barn, the entire interior and exterior of the latter being coated with Gunite.

Messrs. Lilley & Thurston, also report that the new concrete bridge to be constructed across the Alameda creek at Niles, California, will have an exterior coating of Gunite. This bridge will be 500 feet long and 30 feet wide and was designed by County Surveyor Haviland, of Alameda County. The contract for the erection of the bridge has been let to the Locke Construction Company, of San Francisco

Another contract of importance is the large country residence to be erected at Sausalito for Harry Cartan, from plans by Architect C. P. Weeks. Gunite shot from the cement gun over Neponset Black Waterproof building paper and Triangle mesh, style No. 78, Triangle mesh Fabric has been specified without alteration on this job.

Removal Notice

The Bauer Fixture Company have removed to 59-65 Jones street, San Francisco, where they have two floors for their factory and display rooms, thus enabling them to satisfactorily handle their large and rapidly increasing business. Their line of electric and gas fixtures show unusual merit and originality. They offer their services free to architects who desire schemes for lighting of buildings where by utilizing modern methods, great economy and effectiveness can be secured.

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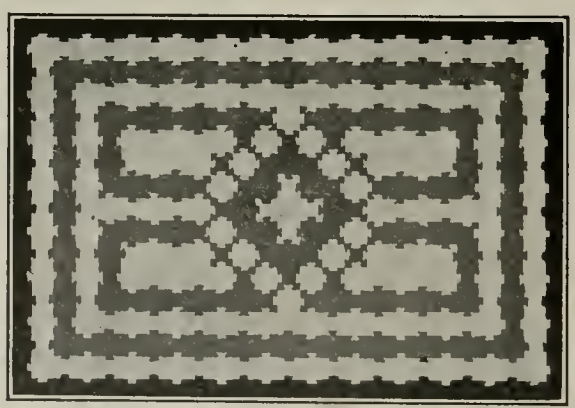

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The Collins Interlocking Steel Studding and Furring has solved the problem. This has been used in San Francisco for several years with splendid success. Since Parrott & Co. took the Coast agency the system has been introduced in Los Angeles and other Coast cities with very satisfactory results.

It is used in the new Gates hotel building at Sixth and Figueroa streets, and in many of the large structures now under way. H. W. Bryson, who is erecting a nine-story reinforced concrete apartment building at the corner of Wilshire boulevard and Rampart streets, has contracted for its use. Many of the large buildings now under construction in San Francisco have the Collins system installed. During the time it has been on the market over 1,000,000 feet of studding has been sold

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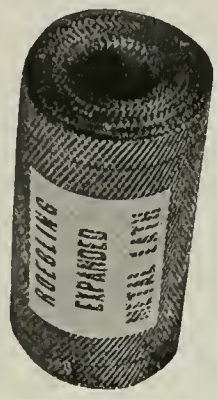

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Walter Scott Does Good Photographic Work

There were many complimentary words passed by readers of The Architect and Engineer upon the excellence of the photographs illustrating the work of Architect C. A. Meussdorffer in the June number, as well as the reproductions of the city hall competition plans in the August issue. Mr. Scott is specializing in architectural work and has photographed many most difficult subjects with splendid success, among them dark interiors; bringing out the detail with remarkable strength and beauty. Mr. Scott's studio is at 558 Market street, and he may be reached by calling telephone Kearny 2688.

The Hunt Corner Bead

Rolph, Mills & Company, of San Francisco, have secured the agency for the Hunt metal corner which architects are finding so satisfactory in plastering work.

The bead sets flush against the corner —easily placed there, having no supports to adjust, and once set the plaster gets in, through and around it and stays there. The Hunt bead can be wired to the lath in one-fifth the time required for other beads.

Back Copy Wanted

The following letter is self explanatory to subscribers who can spare any of their back numbers:

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Dear Sirs:—In preparing the Achitect and Engineer for binding I find that we are lacking No. 1 in Vol. 26. If you can furnish me with a copy of this number I should appreciate it very much in order that we may complete our set for binding. I shall be glad to reimburse you if you will submit a bill.

Yours very truly
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Light Housekeeping Cabinet

The Modern Cabinet Co. of 1217 Divisadero Street, San Francisco, who make a specialty of store and office fixtures, are making a new device adapted to rooming houses. This consists of a light housekeeping cabinet, containing a zinc lined enclosure for a disappearing gas plate and closet, and drawers for kitchen utensils, linen, etc. It is such a complete and ingenious arrangement that it seems to solve the vexed problem of affording cooking conveniences to a living room without making same apparent or visible.

Davis Electric Company

G. W. Davis, formerly of Davis & Doman Electric Co., has formed a partnership with J. H. Hoyle, under the name of Davis Electric Co., and is now located in the Metropolis National Bank Building. The new firm will confine themselves to Electrical Engineering and Contracting and offer their services to architects who require facts or figures.

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A Pocket Estimator

The Fibrestone & Roofing Co., are publishing a "Pocket Estimator" for the use of architects and engineers and which is now in press and will be ready for distribution shortly.

The compilation of this book involved considerable work and cost, and will be a handy reference for architects and engineers, to whom only, it will be sent free of charge, post paid, by addressing "Department A," Fibrestone & Roofing Co., 704 Market street, San Francisco.

This book covers all divisions of building construction from excavation to the roof, estimated per cubic yard, square yard and square foot, as may be the practice in estimating.

Busy Roofing Contractors

Fibrestone & Roofing Company, 704 Market street, San Francisco, have added tile and slate roofing to their contracting, and have recently completed some important contracts in this line, notably, the Southern Pacific Station, Oakland; St. Luke's Hospital, San Francisco; Odd Fellows Home, Saratoga Junction; and Phelan residence, Bonnie Brae, all of which have been tile roofed by them. This company will also lay the tile promenade in the new city hall of Oakland.

They have also slate roofed the Polytechnic High school shop building, San Francisco; Kentucky street police station, San Francisco; Southern Pacific signal tower, Oakland mole, and St. Luke's Hospital, San Francisco.

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Recent Sanitary Cleaner Installations

The Little Giant Suction Cleaner which was first advertised in The Architect and Engineer two months ago, report that they have met with signal success in securing the installation of their stationary cleaner in many residences, where the large cost of other vacuum machinery prohibited the introduction of this labor saving device in small buildings.

The Little Giant Suction Cleaner has just been installed in the following residences: W. G. Nelson, Claremont District, Oakland; A. L. Alper, country residence, Ross, Cal.; F. A. Drake, 735 Folsom street, San Francisco; B. A. Meyers, 11th ave. and Fulton street, San Francisco; Raymond Perry, 1350 5th ave., San Francisco; F. H. Howland, 4610 13th ave., Oakland; Jos. A. Killian, 290 Shafter ave., Oakland; and G. H. Penniman, Burlingame, Cal.

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A Boost for the Automatic Hot Water Heater

Builders are often asked, says the American Carpenter and Builder, the following or something like it:

"Why should I, who am about to build, include a water heater in the plans for my new building?"

This concrete question suggests its own answer, for if a man is about to build a home his all absorbing idea will be to have the building and equipment as near perfect as possible in the matter of comforts and conveniences. Therefore, the plans would not be complete—in fact very incomplete—without some proper and ample arrangement for providing hot water for domestic and lavatory purposes.

He would better omit several other things seemingly indispensable, or, if need be, eliminate ornamentation and artistic effects, rather than sacrifice comfort, health and sanitation by omitting the hot water supply.

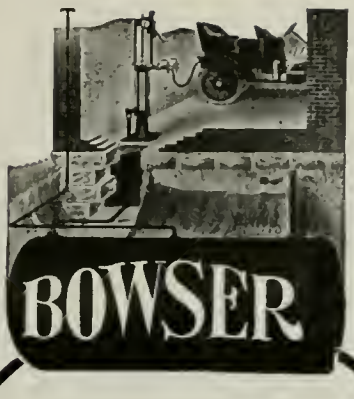
Would he omit the bath tub? Certainly not, but what would the bath tub signify for comfort without hot water to complete the delight and wholesomeness of the bath.

Next to the cooking stove or range in the modern residence, the most necessary and constant requirement is hot water. The range water back is, for the ordinary household, amply large to supply all requirements, but it is now a common occurrence for house owners to abandon the use of the coal range in kitchen during the warm months and if the range is the only means of heating water, this very necessary supply is likewise cut off during the summer.

Up to a few years ago, when hot water was needed during the summer it was a case of "Polly put the kettle on" and then wait until a scanty supply was heated. Later a small gas heater connected right with the range was attached to the boiler and it did fairly well, provided somebody lighted it two or three hours before the hot water was needed.

The great trouble with this lay in the fact that the water was seldom ever hot at the moment it was wanted; in the waste of fuel necessary to maintain a supply of hot water at all times, and to the fact that the whole kitchen was heated up in order to secure a little hot water.

Now all this is avoided by the installation of one of the "instantaneous" gas heaters now on the market. Some of these are set up in the kitchen, some right in the bath room. Both the automatic and non-automatic types are manufactured in a variety of sizes sufficient to meet any requirements, from the average small home or apartment to the



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largest hotel or institution service. The rapidly increasing sales are the best evidence of the popularity of this class of water heater.

There are also many practical and successful basement, coal burning water heaters on the market. For use in residences, apartment buildings and small plants, where it is desirable or necessary to minimize janitor services, a water heater made with a self feeding magazine is found to be satisfactory and efficient.

Experience shows an ordinary family will use from 100 to 120 gallons or more water in 24 hours. The warm water for domestic supply should average 130 to 150 degrees.

Hence a heater should be provided of sufficient capacity to raise the amount of water required per hour, from about 40 degrees in the winter and 60 degrees or more in the summer, to a temperature high enough for lavatory uses.

It is both economical and very good practice to have a storage tank from 50 per cent to 100 per cent greater capacity than the water heater. Thus proportioned, the hot water can be stored or accumulated at times when little water is being used. The heater can be run with a lower and steadier fire.

With a liberal storage tank, sudden or unusual demands for hot water are easily met, and without having to force the heater.

Re-Floredome Construction

Steel Floredomes represent an absolutely new development in building construction. These flat domes, open on the under side, are especially designed for two way reinforced concrete construction. The joists extend on all sides of the Floredomes carrying the load in two directions to the supports. The domes themselves serve merely as fillers replacing the concrete where it is not effective in carrying stresses and greatly reducing the dead weight of the construction.

Absolutely flat ceilings of almost any desired span are readily obtained by the use of Hy-Rib steel sheeting on the under side. This Hy-Rib provides an absolutely straight, true surface for plaster as well as thoroughly reinforcing it with steel. With this Floredome construction all projecting beams below the ceiling line are eliminated as the girders which support the Floredome construction can be readily contained within the depth of the Floredome. An absolutely unbroken, flat ceiling is the result.

Floredomes save greatly in labor in the field and in time of erection. Being nearly two feet square and light in weight, they are handled as easily as an ordinary 12 inch square terra cotta tile which covers less than one-third of the floor space. The joists being over two feet apart instead of 16 inches can be much more rapidly and economically filled with concrete.

Floredomes are water-tight so there can be no possible loss of concrete filling in between joints or in a broken part as with terra cotta tile. The Floredomes being tapered can be readily crated for shipment to any part of the country while ordinary clay tile is restricted in use to the neighborhood of the manufacturing plant because of its weight and consequent cost of freight.

One of the principal advantages of the Floredome construction is its lightness in weight, which saves not only in the construction itself but in all the supporting girders, columns, foundations, etc.

Only the simplest kind of centering and forms are required for Floredome construction as there are no beams to provide for and as the forms are covered with Hy-Rib which provides the proper true surface for plastering. Sometimes this form work is of the open kind with spaces between the boards or perhaps a very rough flooring is laid. Either method is inexpensive and saves considerable in the construction costs.

Floredomes have been used in a number of localities and have the enthusiastic support of architects, engineers, contractors and owners. Tests have shown exceptional strength and rigidity.

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Attractive Show Room of Popular Plumbing Fixture House

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The J. L. Mott Iron Works new showrooms at 135 Kearny street, San Francisco, exemplify the possibilities of modern plumbing of the highest class. In addition to the many individual fixtures exhibited, two complete sample bathrooms demonstrate what can be accomplished by the proper treatment of tiling in conjunction with their imperial porcelain and other high grade sanitary fixtures. Included are many neat and serviceable fixtures requiring but a minimum outlay.

They strongly urge that, whenever possible, owners, architects and plumbers pay a visit to their showrooms, where their goods may be examined, their excellence demonstrated and selections made from the actual samples. Catalogues will be gladly furnished upon request.

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June Copies Wanted

Architect C. A. Meussdorffer, Humboldt Bank Building, San Francisco, will pay 25 cents per copy for a limited number of the June issue of The Architect and Engineer, containing his work. Mr. Meussdorffer distributed more than 250 copies of this issue to his friends and clients.

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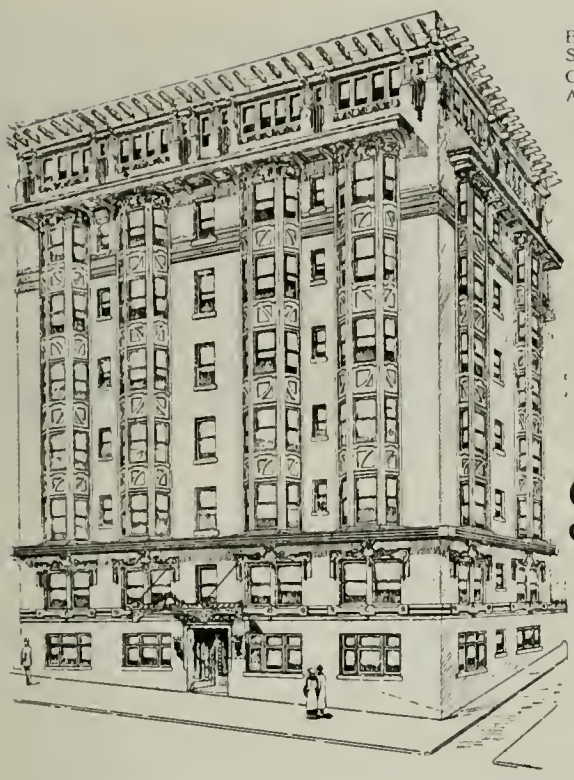

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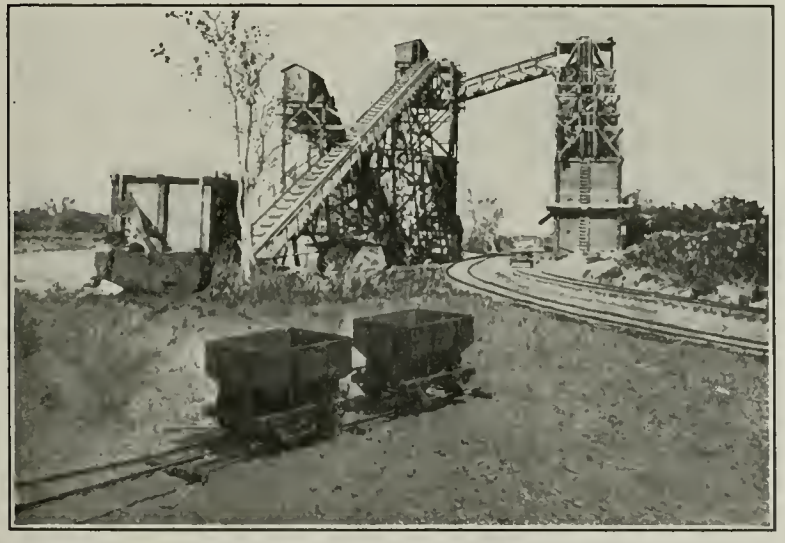

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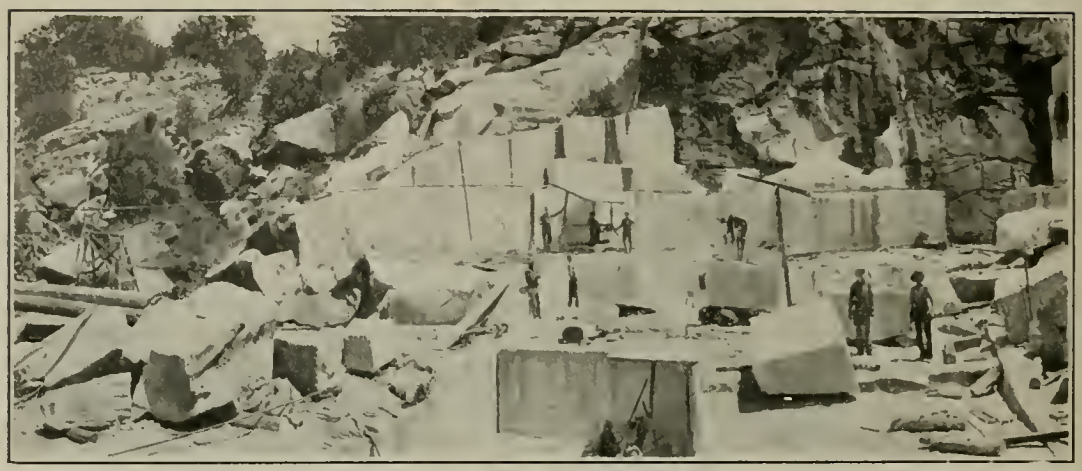

The Above Panoramic View gives one some idea of the vast

A Growing California Industry

THE view above is one of the quarries of the Columbia Marble Company now in active operation and situated near the old mining town of Columbia, Tuolumne County, California. Marble from these quarries has long been acknowledged to be the most durable of any on the market and can be seen in the New Hall of Justice, Merchant's Exchange building, Alaska Commercial building, Rialto building, Union Trust Bank, and many others in San Francisco, also the Santa Rosa Court House, Bank of Alameda, Bank of Eureka, Bank of Monterey and Bank of Stockton. The United States Government is now specifying this marble for Post Office buildings in Idaho, Montana, Wyoming, Arizona and California. The above cut shows only one of six quarries on this property from which is supplied pure white, light blue, dark blue, Portola and California Skyros. All of these marbles may be seen in the full size slab at the company's show rooms, 268 Market street, San Francisco.

Dead Air Space in a Concrete Wall

Editor, The Architect and Engineer:—The article in your June number entitled, "Building Concrete Houses Without Forms," would interest any one that ever had anything to do with building, and it looks to me as if you could go a step further in that line of building and make the wall a little thicker inside and out, and make what I have always called a dead air space or air vacuum. I have built frame buildings and made dead air space in the outside walls, and have found that they were a non-conductor of both heat and cold. I built one residence of seven rooms, and the owner says that when the mercury dropped as low as 27 degrees below zero, he was able to keep all seven rooms comfortable with a hot air furnace, consuming only seven buckets of soft coal every 24 hours. In my opinion you can provide an equally satisfactory air space in a cement wall.

Now this is only an idea of mine, and I thought I would speak to you about it. Have been a reader of The Architect and Engineer for several years; was in the building business when I first took it and still like to read it, and keep in touch with the times. Respectfully,

W. H. ALLEN,
Petaluma, Cal.

Chicago's Woman Engineer

CHICAGO has the distinction of furnishing the first woman recruit to the ranks of the civil engineers. This is Mrs. Mary E. Ewing, widow of the late William Bion Ewing, a most prominent engineer of the Middle West, who died last spring. Mrs. Ewing has taken up and is carrying to successful completion work on various sewerage and water systems costing approximately half a million dollars, which her husband had under way or in course of planning at the time of his death. She appeared before the boards of all the villages and the different companies with whom Mr. Ewing had contracts, and it is a remarkable tribute to her technical knowledge and executive ability that each village and each company unhesitatingly passed the contracts into her hands for completion of the work.

Mrs. Ewing's training, we are informed, was secured by assisting her husband with his work, in which she was intensely interested, throughout their married life, a period of twenty-five years. Much of Mr. Ewing's planning for the larger contracts was done in the quiet of their home, and so Mrs. Ewing had an opportunity to observe

Marble Quarries of the Columbia Marble Company, in Tuolumne County, California.

to the best advantage his methods of work and his solutions of the various problems connected with it. They also read and studied together many of the technical books, while Mrs. Ewing took care of the maps, blue prints, tracings and other drawings, besides otherwise "serving as a good office boy," as she expresses it. In addition to this, she went with her husband on many trips of inspection to the scenes of the actual construction, and thus was enabled to become familiar with the practical side of the work.

Although Mrs. Ewing's entrance into a field of work heretofore unexplored by woman has created widespread interest and discussion, she herself is the least excited of anyone. She considers that civil engineering offers splendid opportunities to women who have inclinations in that direction.

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Ancient Greek Frieze Decoration for Fireplace *Modeled by Ignoce P. Lipp*
(Reprinted from the July Architect and Engineer)

Ancient Greek Frieze Decoration for Fireplace

By Ignace P. Lipp

THE above illustration is one of the recent models for interior decorations turned out of the studios of Ignace P. Lipp, a young sculptor whose work is creating favorable comment among architects and owners of fine homes on the Pacific Coast. At the age of thirty-two Lipp has taken his place with artists of many years his senior by virtue of his genius and originality. His first lessons were taken in the studios of the great Bozart in Paris and after several years' study under other masters he engaged with the decorative staff at the Paris Exposition, Buffalo Pan-American, St. Louis World's Fair, and the Portland, Jamestown and Alaska Yukon Expositions.

Six months ago Mr. Lipp established himself in a finely equipped studio in San Francisco and has since been engaged in designing interior decorations such as columns, friezes, panels, etc., and Roman chairs, vases, fountains and other garden decorations for the homes of many of the wealthy people of California. One of his latest commissions is for the decorative columns in the new Hale store on Market street and he is also busy on several designs which will be submitted to the managers of the forthcoming Panama-Pacific Exposition.

Hexagon Tile

Probably one of the most serviceable and appropriate floors that has been installed in the city recently has just been completed by The Watson Mantel & Tile Company for the Podesta & Baldocchi Company, florists, 224 Grant avenue, San Francisco, who, instead of putting in the stereotyped ceramic, have used a two-inch hexagon tile, which, while a little more expensive as to first cost, will prove to be the cheaper and more satisfactory in the end.

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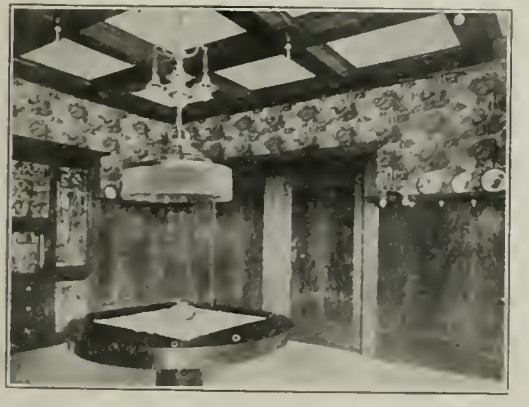

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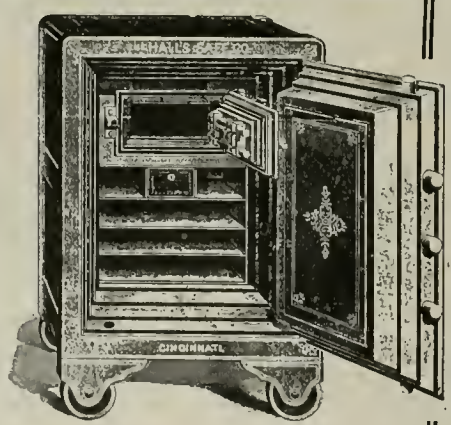

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Good Roads Movement Progressing All Over Country.

The publicity department of the American Road Congress announces that President Taft has given his consent to serve as honorary president of the Congress which is to be held in September or October—exact time and place not having been decided upon. The Congress will be a combination of the conventions of the American Association for Highway Improvement, the American Automobile Association, the National Association of Road Material and Machinery Manufacturers, and affiliated organizations.

The President has agreed to act as honorary president because the congress is designed to crystallize the road movement in the United States. All the associations which are to participate in the Congress have previously been holding individual conventions. All have been working whole-heartedly, but in different ways, for the improvement of the roads of the United States. The Congress will bring all factions together. It will line up the farmers with the automobilists; the state road authorities with the federal authorities; the manufacturers with the engineers; the scientists with the laymen.

The United States Office of Public Roads has arranged to present a complete exhibit of all its electric models, showing road machinery at work, and models showing the various types of road. There will be stereopticon views and lectures by experts. President Taft, as honorary president of the congress, will make an address. The other speakers will include some of the leading government officials, diplomats, engineers and railroad and automobile men. The convention will last a week and there will be a program for the entertainment of the distinguished guests.

The great economic principle at the basis of the educational work of the American Road Congress is that money invested in the public roads makes annual returns almost as great as the money originally expended. The officials of the Congress have prepared figures showing that the improvement of the main highways of the country, constituting about 20 per cent of all public roads, would result in an annual saving of at least $250,000,000 in the cost of hauling alone. It is estimated that the amount saved annually in hauling alone would be sufficient to improve 50,000 miles of road at an average cost of $5,000 per mile. In five years this would improve 250,000 miles of road, which would be sufficient to bring the total mileage of improved highways up to the required 20 per cent. The increase in land values is another important factor that will be dwelt upon at the Congress.

Coloring for Concrete Work

The following materials for colored concrete work have been recommended by an American authority, according to "Cement Age." The quantities given are per barrel of cement, mixed dry with the cement and sand. The sand must be thoroughly dry. In mixing the colors should be made deeper than the required tint, as drying results in bleaching. Venetian red and common lampblack should not be used, as they are liable to run and fade. The schedule for colors is as follows:

For brown, 25 pounds best roasted iron oxide; or 15 to 20 pounds brown ocher.

For black, 45 pounds manganese dioxide.

For blue, 19 pounds ultramarine.

For buff, 15 pounds ocher. (This is likely to considerably reduce the strength of the mixture.)

For green 23 pounds greenish blue ultramarine.

For grey, 2 pounds boneblack.

For red, 22 pounds raw iron oxide.

For bright red, 22 pounds Pompeiian or bright English red.

For purple, 20 pounds Prince's metallic

For violet, 20 pounds violet iron oxide.

For yellow, 22 pounds ocher.

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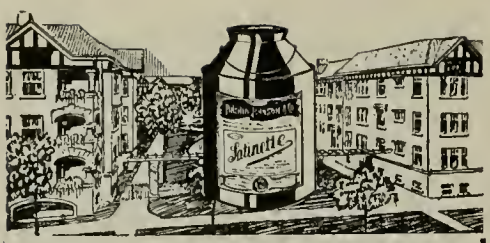

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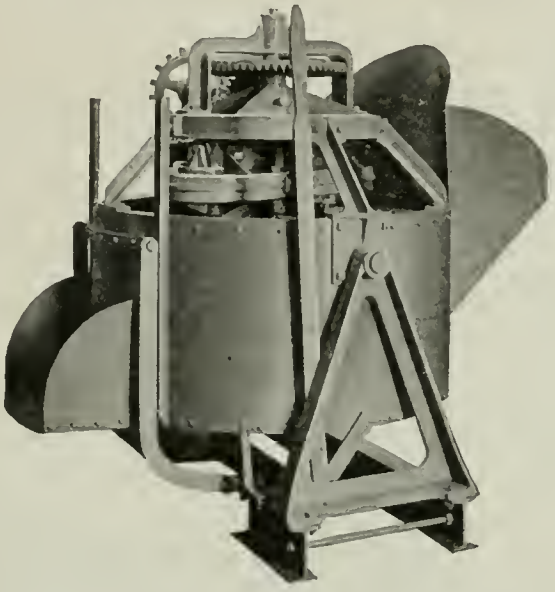

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This well known firm of Contractors is composed of J. M. White and C. F. Cahill, with offices at 101 Post street. Mr. White, who was a brick contractor, started this general contracting business in 1907. Mr. Cahill, who has recently joined the J. M. White Company, has since 1898 been specializing on concrete work.

The J. M. White Company's equipment and facilities for concreting has led to their services being sought by many contractors who did not wish to install mixers and other machinery for the small amount of concrete work embraced in their general contracts. This need has led the J. M. White Company to offer their services for the specific work of "Pouring Concrete," either with or without supplying materials. We believe that the knowledge that prompt and satisfactory work of this character can be secured will solve a vexed problem for many general contractors who are at present "at sea" as to how to economically execute the cement work included in their contracts.

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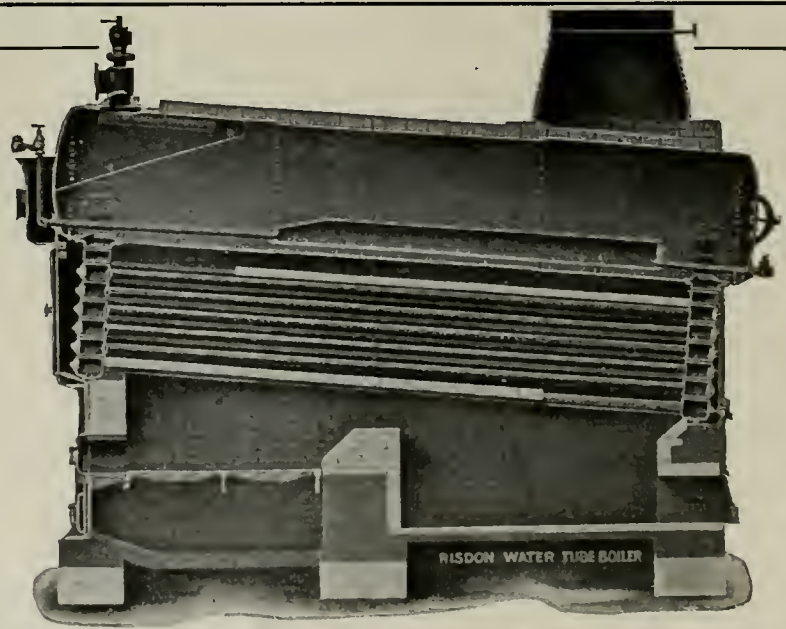

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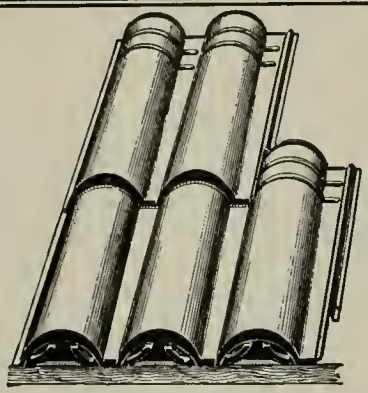

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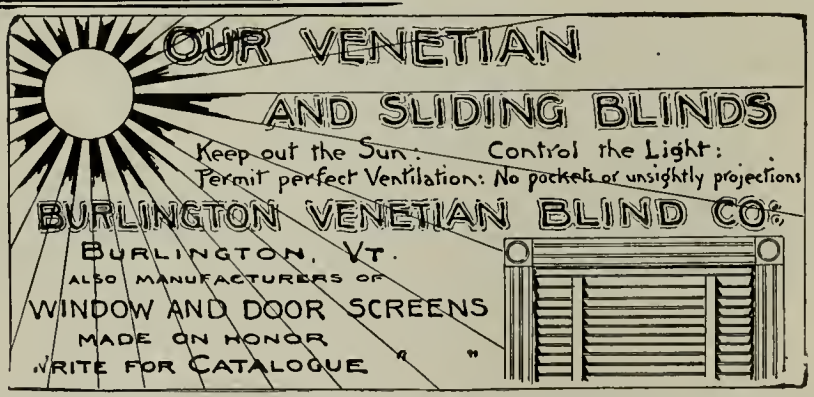

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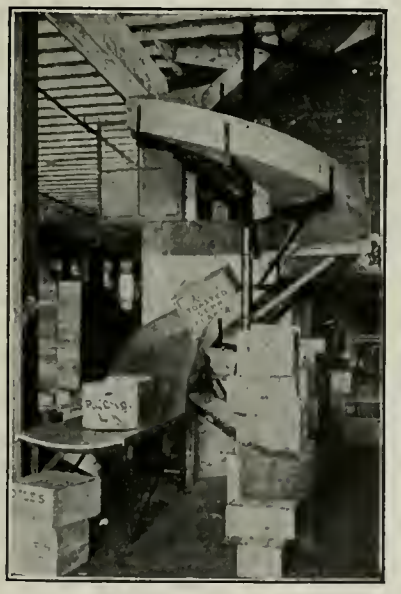

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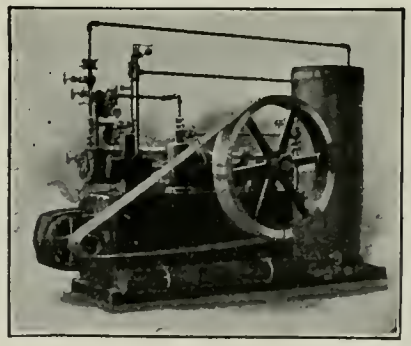

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That the Contractors and Dealers' Association of California, organized a year ago in Sacramento, will become the nucleus of a national organization that shall have as its objects the suppression of strikes and lock-outs and the making of larger profits for the sub-contractor possible, was the general opinion and topic of interest at the fourth quarterly conference of that association's executive committee, held in San Francisco, August 3. The association has 1700 members in California and 500 in San Francisco.

Discussion favorable to action toward bringing about a settlement of the building trades condition in Oakland was also had, and September was mentioned as a favorable time to commence action. For some time the work in Oakland has been done by a "half open shop" and the sub-contractors claim that they are losing considerable money on account of this condition.

The San Francisco local association gave a banquet to the executive committee at which some of these problems of the association were discussed. The State convention for 1913 will likely be held in this city.

The association indorsed the San Francisco branch's president, W. S. Scott, for the State Assembly and pledged its active support. The association decided to take an active part in the promotion of legislation.

Frank K. Glinn of San Francisco, W. S. Simons of Stockton, president of the association, and J. E. Starr were the speakers at the banquet.

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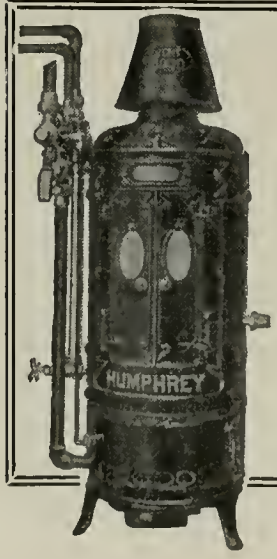

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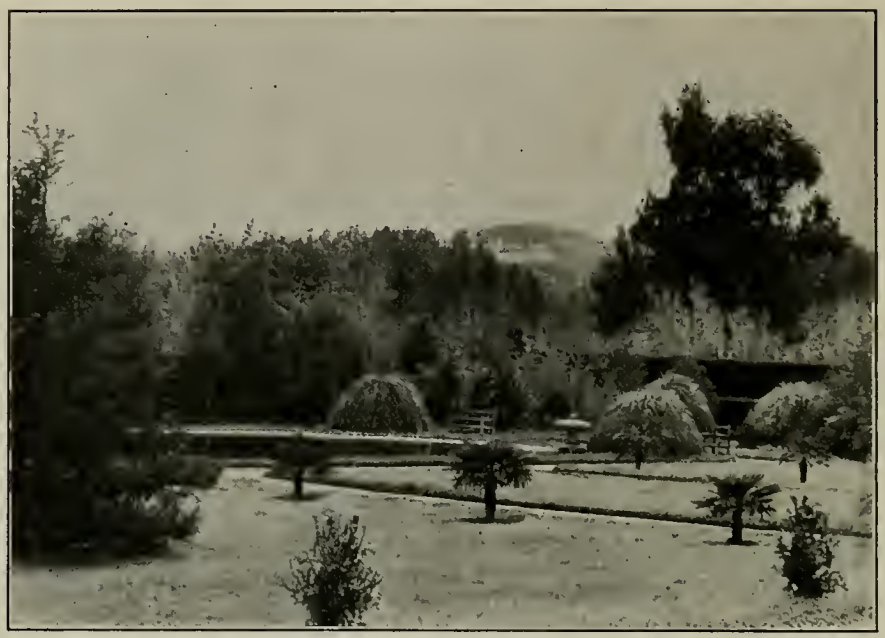

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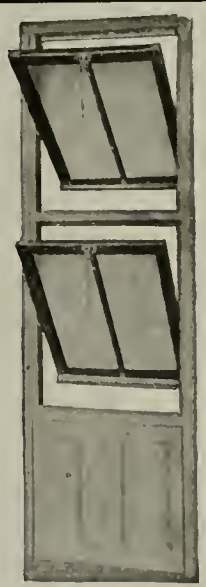

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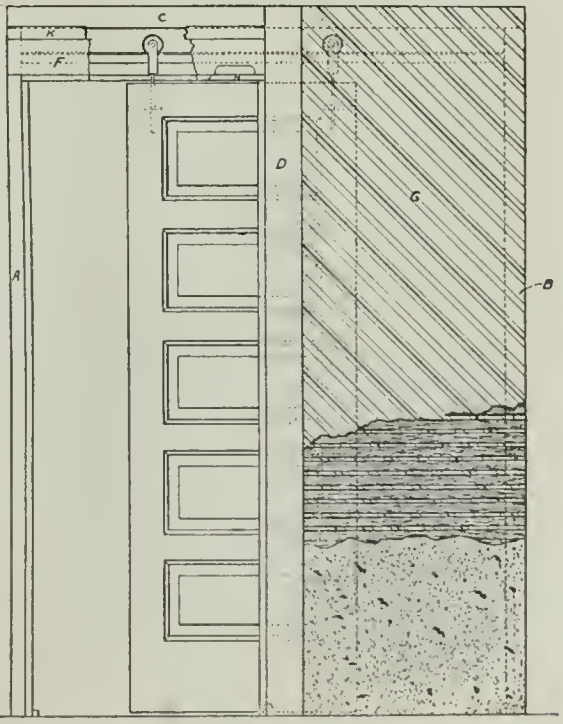

Fig 4

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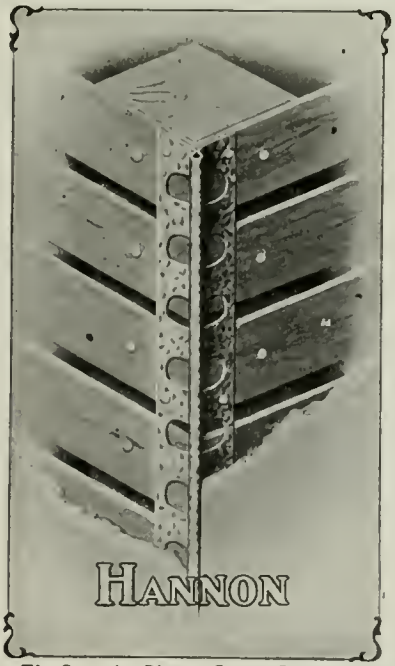

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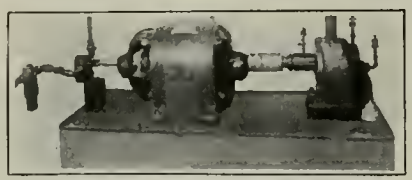

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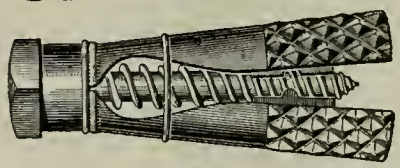

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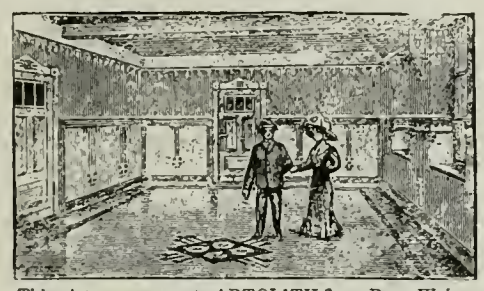

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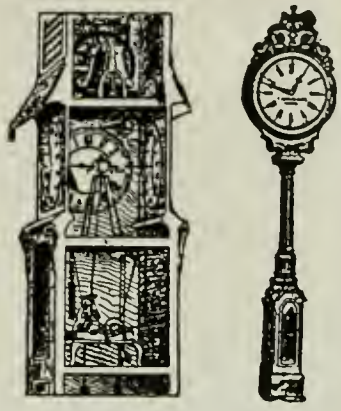

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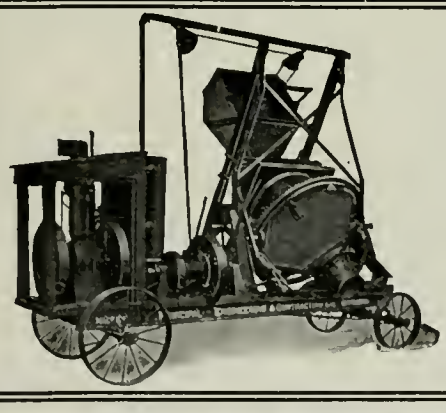

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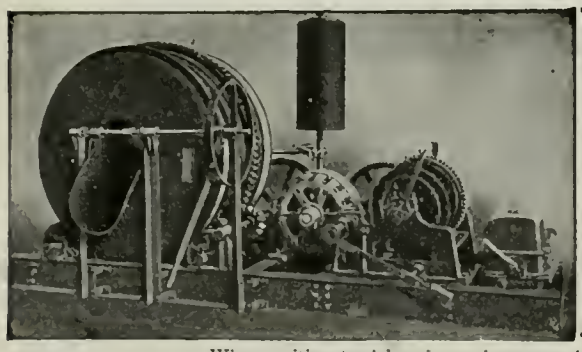

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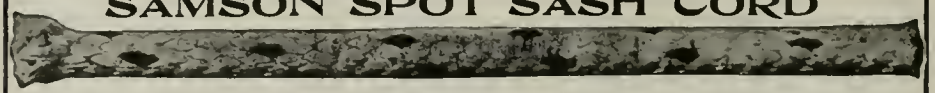

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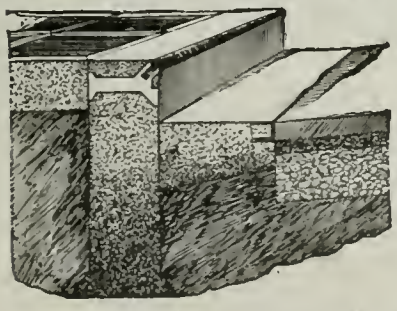

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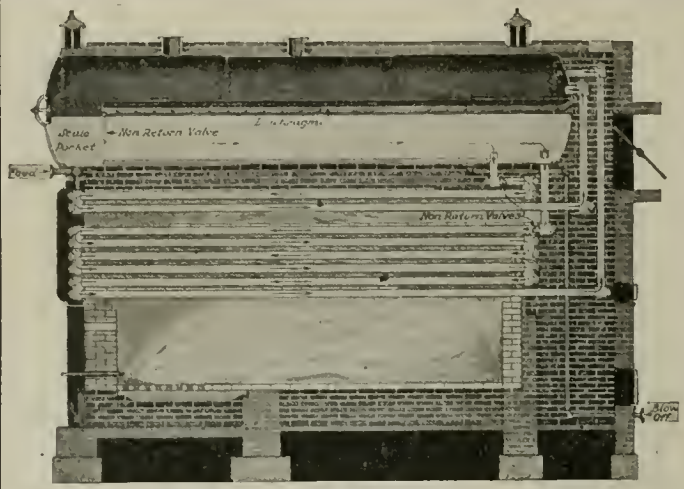

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Dominican Sisters,	M. J. Curtis,	Reno,	Automatic Passenger.
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Kings' Daughters,	Julia Morgan,	Oakland,	" "
M. P. Biddle,	Cunningham & Politeo,	San Francisco,	" "
E. M. Sanford,	Hugh Braunton,	Vancouver,	Passenger.
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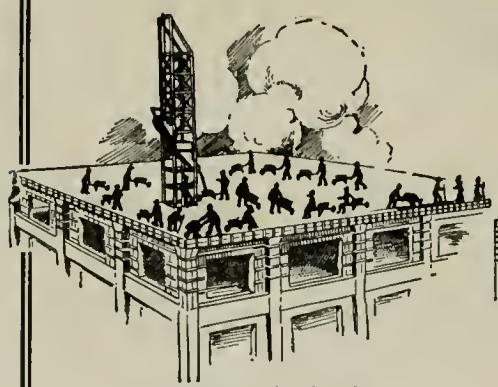

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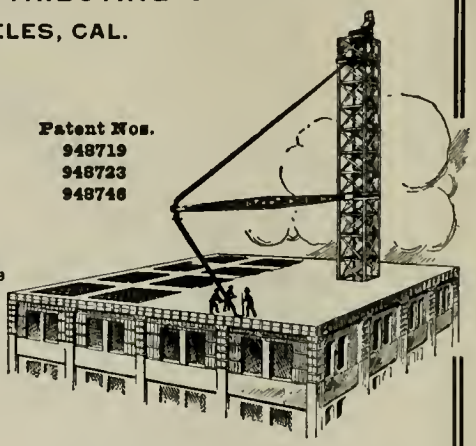

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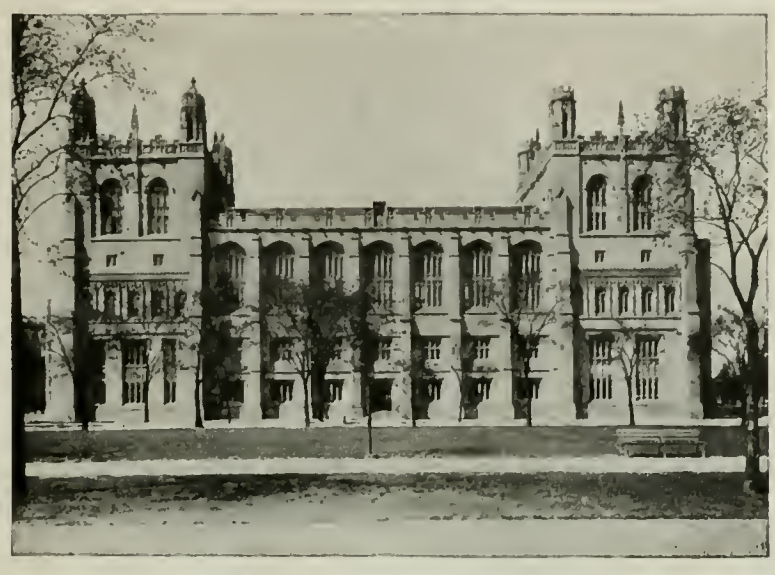

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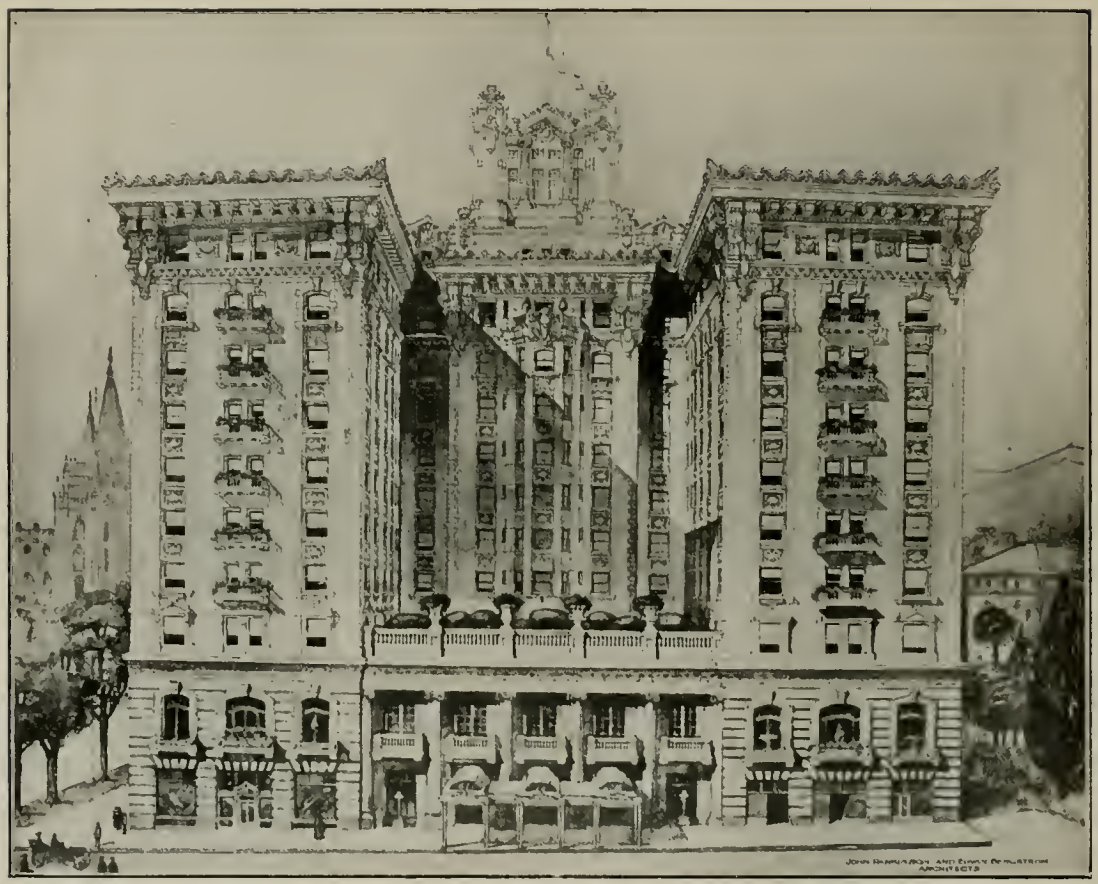

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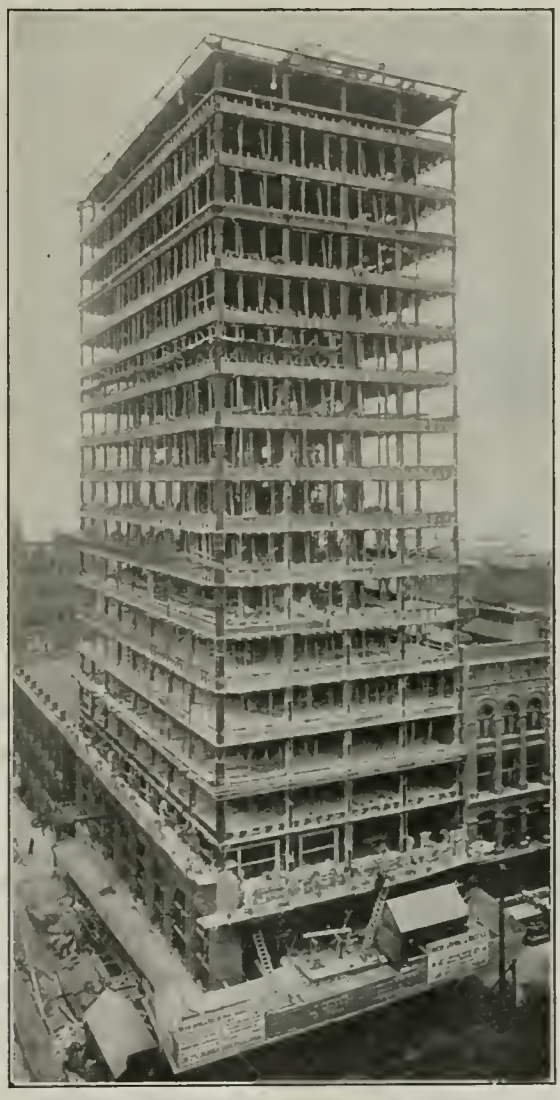

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Los Angeles Pressed Brick Co., Frost Bldg., Los Angeles.
Livermore Fire Brick Co....Livermore, Cal.
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"Kahn System," Trussed Concrete Company, Rialto Bldg., S. F.
Biturine Co. of America, 24 California St., S. F.

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"La Farge," sold by Waterhouse & Price, 59 Third St., S. F.
Medusa White Portland Cement, California Agents, the Building Material Co., Inc., 587 Monadnock Bldg., S. F.
Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

CEMENT EXTERIOR WATERPROOFING
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents. Fife Bldg., S. F.
Glidden's Liquid Cement and Liquid Cement Enamel, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.

CEMENT FLOOR COATING
Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. [See list of distributing agents on page 139.]
Glidden's Concrete Floor Dressing, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.

CEMENT GUN
Lilley & Thurston Co., distributors for Northern California .....Rialto Bldg., S. F.

CEMENT TESTS
Smith, Emery & Co....651 Howard St., S. F.
Robert W. Hunt & Co., 418 Montgomery St., S. F.
R. E. Noble & Co., Humboldt Bank Bldg., S. F.

CHEMICAL ENGINEERS
Smith, Emery & Co., 651 Howard St., S. F.
Robert W. Hunt & Co., 418 Montgomery Street, San Francisco.
R. E. Noble & Co., Humboldt Bank Bldg., S. F.

CHURCH INTERIORS
Burlingame Cabinet Works, 509-511 Sixth Street, San Francisco.
Fink & Schindler.....218 13th St., S. F.

CLOCKS—TOWER AND STREET
E. Howard Clock Company.....New York
For Pacific Coast agents see advertisement.

COLD STORAGE INSULATION
"Hydrex" Felt & Compound, manufactured by Hydrex Felt & Engineering Co., N. Y.; sold by Rolph, Mills & Co., Metropolis Bank Bldg., S. F.
Neponset Waterdyke Felt and Compound manufactured by F. W. Bird & Son, East Walpole, Mass.; sold by Parrott & Co., 320 California St., S. F.

COMPOSITION FLOORING
Artolith Mfg. Company, 149 Turk St., S. F.
Fibrestone & Roofing Co., 704 Market St., S. F.
H. M. Parry & Co., 145 Montgomery St., S. F.

CONCRETE CONSTRUCTION
Esterly Construction Co.....Berkeley, Cal.
Foster Vogt Co....722 Hearst Bldg., S. F.
Petersen, H. L. .....62 Post St., S. F.
Ransome Concrete Company, 57 Post St., S. F.
Van Sant-Houghton Company, 503 Market St., S. F.
J. M. White Company....101 Post St., S. F.
Willis A. Clark & Co., 657 Monadnock Bldg., S. F.

CONCRETE MIXERS
Chicago Improved Cube Mixer. Pacific Coast Offices, 338 Brannan St., S. F., and F. T. Crowe & Co.....Portland and Seattle.
Foote Mixers sold by Langford, Bacon & Myers.....215 Rialto Bldg., S. F.
Ransome Mixers, sold by Norman B. Livermore & Co....Metropolis Bank Bldg., S. F.
Planetary Mixers, manufactured by Enterprise Foundry Co...200 Second St., S. F.

CONCRETE PILES
Harron, Rickard & McCone, Townsend Street, San Francisco.
Portland Concrete Pile & Equipment Co., Phelan Bldg., S. F.

CONCRETE POURING APPARATUS
Concrete Appliances Co., Los Angeles; Parrott & Co., Coast Representatives, San Francisco, Portland, Seattle.

CONCRETE REINFORCEMENT
Clinton Fireproofing System, L. A. Norris, Monadnock Bldg., S. F.
International Fabric & Cable, represented by Western Builders' Supply Co., 680 Mission St., S. F.
Plain and Twisted Bars, sold by Baker & Hamilton, San Francisco, Los Angeles and Sacramento.
Triangle Mesh Fabric, Sales Agents, The Lilley & Thurston Co....Rialto Bldg., S. F.
Twisted Bars, sold by Woods & Huddart, 444 Market St., S. F.

Specify... For Plastering

HOLMES DIAMOND SANTA CRUZ LIME

PHONE KEARNY 2220
Guaranteed Against Pitting or Popping

The Holmes Lime Co.
Monadnock Bldg., San Francisco

MANTELS AND FLOOR TILING

Specialists in **FAIENCE MANTELS** and Designs gotten out for Architects in any Mantel or Floor Tile Work. Estimates gladly given. Complete line of Fireplace Fixtures. Visit our Store. **WATSON MANTEL & TILE CO.**

457 MARKET STREET, PHONE SUTTER 1687.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

CONCRETE SURFACING
"Alkacene" Liquid Concrete, Boyd & Moore, 356 Market St., S. F.
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
Buswell's Steel and Concrete Paints, Oakland, Cal.
"Concreta," sold by W. P. Fuller & Co., S. F.
Concreto, Worden-Meeker Varnish Co., S. F. and Oakland.
Glidden Liquid Cement, manufactured by Glidden Varnisb Company, Whittier, Coburn Co., San Francisco and Los Angeles, Pacific Coast Distributors.
WESCO—West Coast Kalsomine Co., 110 Hansford Bldg., S. F.

CONSTRUCTION MATERIAL
Electric Appliance Co., 807 Mission St., S. F.

CONTRACTORS, GENERAL
Commary-Peterson Co., Inc., 46 Kearny St., S. F.
Elam, Thos. & Son, Builders' Exchange, S. F.
Esterly Construction Co.....Berkeley, Cal.
F. O. Engstrum Co., East Fiftb and Seaton Sts., Los Angeles.
Foster, Vogt Co.,....722 Hearst Bldg., S. F.
Geo. H. Stoffels & Co., 830 Pacific Bldg., S. F.
Geo. W. Boxton.....Hearst Bldg., S. F.
Hansen, F. L., 525 Monadnock Bldg., S. F.
Holm & Son.....Foxcroft Bldg., S. F.
Harvey A. Klyce.. ..Monadnock Bldg., S. F.
McLaren & Peterson, 706-707 Williams Bldg., S. F.
C. P. Moore Building Co., Monadnock Bldg., S. F.
Locke Construction Company, Crocker Bldg., S. F.
Nortbern Construction Co., Mills Bldg., S. F.
William H. Henning..Examiner Bldg., S. F.
Ransome Concrete Co., 1218 Broad'y, Oakland
Rickon-Ehrbart Eng. & Const. Co., 1859 Geary St., S. F.
Robert Trost...26tb and Howard Sts., S. F.
Peterson & Wilson.....1113 Post St., S. F.
Wm. Bateman.....1915 Bryant St., S. F.
Van Sant-Houghton Co., 503 Market St., S. F.
Williams Bros. & Henderson, 351 Monadnock Bldg., S. F.
The J. M. White Bros....101 Post St., S. F.

CORNER BEAD
Hunt Metal Corner Co., 201 Devonshire St., Boston, Mass.
"Prescott," sold by Boyd & Moore, 356 Market St., S. F.
Union Metal Corner Company, 144 Pearl St., Boston, represented on the Pacific Coast by Waterbouse & Price.

CRUSHED ROCK
Natomas Consolidated of California, Peoples Savings Bank Bldg., Sacramento, Cal.
Niles Rock, sold by California Building Material Company.....Pacific Bldg., S. F.
J. P. Holland.....Army St. Wharf, S. F. Phone Mission 5466.
Niles Sand, Gravel & Rock Co., Mutual Savings Bank Bldg., S. F.

CORK TILING
Nonpareil Cork Tiling, David E. Kennedy, Inc., N. Y. Pacific Coast office, Phelan Building, S. F., G. H. Freear, Mgr.

DAMP-PROOFING COMPOUND
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
Biturine Co. of America, 24 California St., S. F.
Glidden's Liquid Rubber, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
"Hydrex" Felt & Compound, manufactured by Hydrex Felt & Engineering Co., New York, sold by Rolpb, Mills & Co., Metropolis Bank Bldg., S. F.
Lithoid Product Company, Merchants Exchange Bldg., S. F.
"Pabco" Damp Proofing Compound, sold by Paraffine Paint Co.....34 First St., S. F.
Parrott & Co., agents for Genasco Positive Seal Damp Proof Paint.
"Protectorine," Compound, sold by Boyd & Moore.....356 Market St., S. F.
H. D. Samuel Co....Monadnock Bldg., S. F.
WESCO—West Coast Kalsomine Co., 110 Hansford Bldg., S. F.

DOOR HANGERS
Pitcher Hanger, sold by Pacific Tank Company.....231 Berry St., S. F.
Reliance Hanger, sold by Sartorius Co., S. F.; D. F. Fryer & Co., Louis R. Bedell, Los Angeles, and Portland Wire & Iron Works.

DOOR OPENER
Carlson Door Opener and Closer, 1622A Howard St., S. F.

CALIFORNIA MARBLE

Seven Different Grades—Superior Finish—Moderate Price
Used in the New San Francisco Hall of Justice, Merchants Exchange Building, Alaska Commercial Building, and others.

COLUMBIA MARBLE COMPANY

268 MARKET STREET, Rooms 201-202 SAN FRANCISCO, CAL.

"FIBRESTONE"

SANITARY FLOORING, WAINSCOT AND BASE. Laid Exclusively by
FIBRESTONE & ROOFING CO., 704 Market St. San Francisco Tel. Sutter 329

ARCHITECTS' SPECIFICATION INDEX—*Continued*

DOORS—DISAPPEARING
Pacific Tank & Pipe Co.,231 Berry St., S. F.

DOORS AND SHUTTERS
Kinnear Steel Rolling Doors and Shutters, Lilley & Thurston Co., Rialto Bldg., S. F.

DOORS—WAREHOUSE
"Cross" Horizontal Folding Doors, Boyd & Moore, Agents.....356 Market St., S. F.
Wells & Spencer Machine Company, 173 Beale St., S. F.

DUMB WAITERS
Energy Dumb Waiters, Boyd & Moore, Agents.....356 Market St., S. F.

ELECTRICAL CONTRACTORS
American Electrical Engineering Co. 435 Golden Gate Ave., S. F.
Butte Engineering Co..683 Howard St., S. F.
Central Electric Co..185 Stevenson St., S. F.
Davis & Doman Electric Co., 1220 Webster St., S. F.
Electric Appliance Co., 807 Mission St., S. F.
Garden City Electrical Co.....San Jose, Cal.
Jno. G. Sutton Co.....243 Minna St., S. F.
Pacific Fire Extinguisher Company, 507 Montgomery St., S. F.

ELEVATORS
Otis Elevator Company, Stockton and North Point, S. F.
Van Emon Elevator Co..54 Natoma St., S. F.
Wells & Spencer Machine Co., 173 Beale St., S. F.

ELEVATOR CARS
Cleveland Art Metal Co., Boyd & Moore, Agents .....356 Market St., S. F.

ELEVATOR DOORS
"Cross" Elevator Doors, Boyd & Moore, Inc., Agents.....356 Market St., S. F.
Dahlstrom Metallic Door Co., Rialto Bldg., S. F.

ELEVATORS, SIGNALS, FLASHLIGHTS AND DIAL INDICATORS
Elevator Supply & Repair Co., 593 Market St., S. F.

ENGINEERS
F. J. Amweg.....700 Marston Bldg., S. F.
W. W. Breite.....Clunie Bldg., S. F.
J. C. Hurley..... 12 Geary Street, S. F.
Hunter & Hudson, Monadnock Bldg., S. F.
Rickon & Ehrhart, 1859 Geary St., S. F.
Van Sant-Houghton Co., 503 Market St., S. F.

EXPRESS CALL SYSTEM
Elevator Supply & Repair Co., 593 Market St., S. F.

FIRE ESCAPES
Pacific Structural Iron Works, Structural Iron and Steel, Fire Escapes, etc. Phone Market 1374; Home, I 3435..370-84 Tenth St., S. F.
H. Johns-Manville Company, Branches in all Principal Coast Cities.

FIRE EXTINGUISHERS
Marsball & Schimpf.....Clunie Bldg., S. F.
Pacific Fire Extinguisher Co., 507 Montgomery St., S. F.

FIREPLACE DAMPER
Head, Throat and Damper for open fireplaces, Colonial Fireplace Co., Chicago.
(See advertisement for Coast agencies.)

FIREPROOFING
Gladding, McBean & Company, Crocker Bldg., S. F.
Los Angeles Pressed Brick Co., Frost Bldg., L. A.
Roebling Construction Co., Crocker Bldg., S. F.

FIRE PROTECTION—SPRINKLER SYSTEM
Jno. G. Sutton Co....243 Minna St., S. F.
Pacific Fire Extinguisher Company, 507 Montgomery St., San Francisco; Branch Offices, Portland, Seattle and Spokane.
Marsball & Schimpf.....Clunie Bldg., S. F.

FIXTURES—BANK, OFFICE, STORE, ETC.
Burlingame Cabinet Works, 509-511 Sixth Street, San Francisco
A. J. Forbes & Son..1530 Filbert St., S. F.
Fink & Schindler.....218 13tb St., S. F.
T. H. Meek Company..1157 Mission St., S. F.
C. F. Weber & Co., 365 Market St., San Francisco and 210 N. Main St., Los Angeles, Cal.

FLOOR TILING
Watson Mantel & Tile Co., 457 Market St., S. F.

FLOOR VARNISH
Bass-Hueter and S. F. Pioneer Varnish Works, 816 Mission St., S. F.
R. N. Nason & Co...151 Potrero Ave., S. F.
Standard Varnish Works, Chicago, New York and S. F.
Worden-Meeker Varnish Works, S. F. and Oakland

FLOORS—CORK
Nonpariel Cork Tiling, David E. Kennedy, Inc., N. Y. Distributor for the Pacific Coast, G. H. Freear, Phelan Building, S. F.

FLOORING—MAGNESITE
Fibreston & Foofing Co., 704 Market St. S. F.
Mallott & Peterson, 682 Monadnock Bldg., S. F.

GAS PLATE CABINETS
Modern Cabinet Company, 1217 Divisadero St., S. F.
Pacific Hardware & Steel Co., San Francisco, Los Angeles and Portland.
A. W. Pike.....711 Mission St., S. F.

GARAGE EQUIPMENT
Bowser Gasoline Tanks and Outfit, Bowser & Co. .....612 Howard St., S. F.

GARBAGE BURNERS
Water Heating Garbage Burners, sold by Cal. Hydraulic Eng. & Supply Co., 70 Fremont St., S. F.

GARBAGE CHUTE
Bill & Jacobsen.....524 Pine St., S. F.

GLASS AND GLAZING
California Plate and Window Glass Company, 864 Mission St., San Francisco.
W. P. Fuller & Co., San Francisco, Los Angeles and Portland.

GRAPHITE
Detroit Grapbite Co..301 Hearst St., S. F.

GRAVEL, SAND AND CRUSHED ROCK
Bay Development Co.....153 Berry St., S. F.
California Building Material Co., Pacific Bldg., S. F.
Del Monte White Sand, sold by Pacific Improvement Co.....Crocker Bldg., S. F.
Grant Gravel Co.....87 Third St., S. F.
J. P. Holland.....Army St. Wharf, S. F.

HARD WALL PLASTER
Niles Sand, Rock and Gravel Co., Mutual Bank Building, S. F.
Empire Hard Wall Plaster, sold by Pacific Portland Cement Co., Pacific Bldg., S. F.
Reno Hard Wall Plaster, sold by Western Building Material Co., 430 California St., S. F.

HARDWARE
Brittain & Co....San Francisco and Oakland.
Russwin Hardware, Joost Bros., S. F.

HARDWOOD FLOORING
Boyd & Moore.....356 Market St., S. F.

WELLS AND SPENCER MACHINE CO.
F. M. SPENCER, SUCCESSOR
173-177 BEALE ST., SAN FRANCISCO
REPRESENTING
WESTERN ELEVATOR COMPANY
REPAIRS, INSPECTIONS AND DUMB WAITERS
TELEPHONES: KEARNY 664, HOME J 1124

ARCHITECTS' SPECIFICATION INDEX—*Continued*

HARDWOOD FLOORING, Continued
Dieckmann Hardwood Co.,
Beech St., cor. Taylor, S. F.
E. A. Howard & Co., 20 Howard St., S. F.
Strable Mfg. Co.....Oakland, Cal.
New York Hardwood Floor Co.,
784 O'Farrell St., S. F.
Parrott & Co.....320 California St., S. F.
Wbite Bros., Cor. Fifth and Brannan Sts., S. F.
Hardwood Interior Co., 554 Bryant St., S. F.

HARDWOOD LUMBER
Dieckmann Hardwood Co.,
Beach St., cor. Taylor, S. F.
Parrott & Co.....320 California St., S. F.
Strable Mfg. Co.,
First St., betw. Washington & Clay, Oakland.
White Bros., Cor. Fifth and Brannan Sts., S. F.

HARDWOOD VENEER PANELS AND DOORS
E. A. Howard & Co....Howard St., S. F.

HEATERS—AUTOMATIC
Hoffman Heater, sold by Holbrook, Merrill & Stetson, San Francisco and Los Angeles.
Humphrey Co.,
565 N. Rose St., Kalamazoo, Mich.
Pittsburg Water Heater, sold by Thos. Thieben & Co. .....667 Mission St., S. F.

HEATING ENGINEERS
General Engineering Co.,
231-3-5 Natoma St., S. F.

HEATING EQUIPMENT—VACUUM, ETC.
C. A. Dunham Co., Marshalltown, Iowa, Western Division Office.
Monadnock Bldg., S. F.
Guernsey & Wbeeler, ...Rialto Bldg., S. F.
Marshall & Schimpf.....Clunie Bldg., S. F.

HEATING AND VENTILATING
Atlas Heating & Ventilating Co.,
Fourth and Freelon Sts., San Francisco.
Fess System Co.....220 Natoma St., S. F.
Guernsey & Wheeler....Rialto Bldg., S. F.
Gilley-Schmid Co., Inc.,
Thirteenth and Mission Sts., S. F.
General Engineering Company,
281 Natoma St., S. F.
Hoffman & Meusser,
1129-1131 Howard St., San Francisco.
J. C. Hurley..... 12 Geary Street, S. F.
S. T. Johnson Co.....1334 Mission St., S. F.
Mangrum & Otter, Inc., 507 Mission St., S. F.
H. W. Moffat, ...Pacific Bldg., S. F...
Jno. G. Sutton Co....243 Minna St., S. F.
Pacific Blower & Heating Co.,
17th St., betw. Mission and Valencia, S. F.
Pacific Fire Extinguisher Company,
507 Montgomery St., S. F.
Petersen-James Co....710 Larkin St., S. F.

HINGES
Stanley's Ball-Bearing Hinges, Stanley Co.,
New Britain, Conn.

HOTELS
The Angelus, Loomis Bros.....Los Angeles

ICE MAKING MACHINES
"The Wizard." sold by the De Laval Dairy Supply Co., Drumm and Sacramento streets, San Francisco.

INGOT IRON
American Rolling Mill Co., Middleton, Ohio.
California Corrugated Culvert Co.,
5th and Parker Sts., West Berkeley.

INLAID FLOORS
Hardwood Interior Co., 554 Bryant St., S. F.

INTERIOR WOODWORK
New York Hardwood Floor Co.,
784 O'Farrell St., S. F.

INTERIOR WALL FINISH
Satina mfg'd. by C. H. Brown Paint Co.,
F. A. Frisius, 341 Lincoln ave., Alameda, California.

INSPECTIONS AND TESTS
R. E. Noble & Co., Humboldt Bank Bldg., S. F.
Robert W. Hunt & Co.,
418 Montgomery St., S. F.
Smith, Emery & Co. Inc.,
651 Howard St., S. F.

INSULATING MATERIALS
Armstrong Cork Co..... Pittsburg, Pa.

INSURANCE
David Duncan.....340 Sansome St., S. F.

INTERIOR DECORATING
The Tozer Company, 228 Grant Ave., S. F.

JOIST HANGERS
Western Builders' Supply Co.,
680 Mission St., S. F.

KITCHEN BOILERS
Victor Boiler Co.,
Fourth and Washington Sts., Oakland

KITCHEN EQUIPMENT
John G. Ils & Co....855 Mission St., S. F.

LANDSCAPE ENGINEERS
MacRorie & McLaren Co.,
Westbank Bldg., S. F.

LIME
J. P. Holland.....Army St. Wharf, S. F.
Holmes Lime Company,
Monadnock Bldg., S. F.
Sbasta Lime Products Company,
1550 Bryant St., S. F.

LIGHTING FIXTURES
Adams & Hollopeter....745 Mission St., S. F.
Bauer Fixture Co.....49-55 Jones St., S. F.

LIGHT, HEAT AND POWER
Pacific Gas & Elec. Co..445 Sutter St., S. F.

LOCKERS—METAL
Hart & Cooley Co., Boyd & Moore, Agents,
356 Market St., S. F.

LUMBER
Sunset Lumber So.....Oakland, Cal.
Santa Fe Lumber Co.,
Seventeentb and De Haro Sts., S. F.

MANTELS
Mangrum & Otter ....561 Mission St., S. F.
S. Ginsberg & Co.....1029 Larkin St., S. F.
Watson Mantel & Tile Co.,
457 Market St., S. F.
Thos. F. Rigney, ...9 City Hall Ave., S. F.

MARBLE
Columbia Marble Co...268 Market St., S. F.

METAL AND STEEL LATH
Baker & Hamilton, 433 Brannan St., S. F.
Roebling Construction Co.,
Crocker Bldg., S. F.
L. A. Norris & Co., Monadnock Bldg., S. F.

METAL CEILINGS
Berger Mnfg. Co....1120 Mission St., S. F.
San Francisco Metal Stamping & Corrugating Co.....Treat Ave. and 19th St., S. F.

METAL DOORS AND WINDOWS
Capitol Sheet Metal Works,
1927 Market St., S. F.
Dahlstrom Metallic Door Co., Western office,
Rialto Bldg., S. F.
S. Ginsberg & Co., 1029 Larkin St., S. F.
Rulofson Metal Window Works,
Eighth and Brannan Sts., San Francisco.
Fink & Schindler Co., 218 13th St., S. F.

METAL SHINGLES
Meurer Bros., I. A. McDonald, Pacific Coast Agent.... Third, near Townsend St., S. F.
San Francisco Metal Stamping & Corrugating Co.....Treat Ave. and 19th St., S. F.
L. B. Hooker Co., 1530 Howard St., S. F.

MIXERS
Enterprise Foundry Co., 200 2d St., S. F.

OIL BURNERS
S. T. Johnson Co...1334 Mission St., S. F.
Fess System Co.....220 Natoma St., S. F.
T. P. Jarvis Crude Oil Burner Co.,
275 Connecticut St., S. F.

Opera Chairs

Theatre Chairs and School Desks
At ONE DOLLAR EACH
Write for Particulars *"Everything in Seating"*
WHITAKER & RAY-WIGGIN CO., SAN FRANCISCO

School Desks

ARCHITECTS' SPECIFICATION INDEX—*Continued*

OFFICE FURNITURE
Modern Cabinet Company, 1217 Divisadero St., S. F.

OPERA CHAIRS
C. F. Weber & Co....365 Market St., S. F.
Whitaker & Ray-Wiggin Co., San Francisco and Los Angeles.

ORNAMENTAL IRON AND BRONZE
J. G. Braun.....Chicago and New York
California Artistic Metal and Wire Company, San Francisco.
Ralston Iron Works, 20th and Indiana Sts., S. F.
Standard Company, represented by Mailler Searles.....817 Monadnock Bldg., S. F.
Standard Iron Works, 235-39 Shipley St., S. F.
Golden Gate Structural & Ornamental Iron Works .....1479 Mission St., S. F.
C. J. Hillard Company, Inc., 211-215 8th St., S. F.
West Coast Wire & Iron Works, 861-863 Howard St., S. F.

OVENS—BREAD AND PASTRY
New Era Oven Co., 2560 Sutter St., S. F.

PAINT FOR STEEL STRUCTURES
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
Buswell's Steel and Concrete Paints, Oakland, Cal.
Detroit Superior Graphite Paint, manufactured by Detroit Graphite Company. C. W. Pike Company, Coast Sales Agents, 22 Battery St., S. F.
Glidden's Acid Proof Coating, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.

PAINT FOR CEMENT
Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. (Inc.), [See adv. in this issue for Pacific Coast agents.]
Glidden's Liquid Cement, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
Vitrolite Cold Water Paint, sold by Boyd & Moore.....356 Market St., S. F.

PAINTS, OILS, ETC.
Bass-Hueter Paint Company, Mission, near Fourth St., S. F.
R. N. Nason Company.....San Francisco
"Biturine," sold by Biturine Co. of America, 24 California St., S. F.
Glidden Varnish Co., Cleveland, Ohio, represented by Whittier-Coburn Co., S. F. and Los Angeles
Paraffine Paint Co....38-40 First St., S. F.
Standard Varnish Works, represented by W. P. Fuller & Co., S. F. and Los Angeles.

PAINTS, OILS, ETC., Continued
Wesco—West Coast Kalsomine Co., 110 Hansford Bldg., S. F.
Worden-Meeker Varnish Co., S. F. & Oakland.

PAINT PRODUCTS
Felix Gross Co.,.....440 Ninth St., S. F.

PHOTO ENGRAVING
California Photo Engraving Co., 121 Second St., S. F.

PHOTOGRAPHY
Arthur J. Brunner Co...47 Kearny St., S. F.
Gabriel Moulin.....153 Kearny St., S. F.
Walter Scott.....558 Market St., S. F.

PIPE—CORRUGATED INGOT IRON
California Corrugated Culvert Company, Los Angeles and West Berkeley.

PIPE—VITRIFIED SALT GLAZED TERRA COTTA.
N. Clark & Sons, 112 Natoma St., San Francisco
Gladding McBean & Co., Crocker Bldg., S. F.
Pacific Sewer Pipe Company, I. W. Hellman Bldg., Los Angeles
Steiger Terra Cotta and Pottery Works, Mills Bldg., S. F.

PLASTER
Empire Plaster, The Nevada Gypsum Co., Pacific Bldg., S. F.

PLASTERING CONTRACTORS
Geo. MacGruer....319 Mississippi St., S. F.

PLUMBING
J. E. O'Mara. .....443 Minna St., S. F.
Jno. G. Sutton Co.....243 Minna St., S. F.
Peterson-James Co.....710 Larkin St., S. F.
Wetzel & Grass,.....105 Fulton St., S. F.
Wittman, Lyman & Co., 315 Polk St., S. F.

PLUMBING FIXTURES, MATERIALS, ETC.
Crane Co....Second and Brannan Sts., S. F.
Jno. Douglas Co....571 Mission St., S. F.
Haines, Jones & Cadbury Co., 851-859 Folsom St., S. F.
P. F. Howard Co., Second and Folsom Sts., S. F.
Louis Lipp Company, Winton Place, Ohio. Pacific Coast Office, 693 Mission St., S. F.
Mark-Lally Co..First and Folsom Sts., S. F.
J. L. Mott Iron Works, D. H. Gulick, selling agent .....135 Kearny St., S. F.

PLUMBERS' SUNDRIES
Orca Sanitary Toilet Seat, manufactured by Orca Mfg. Co., 700 Hooker & Lent Bldg., S. F.

PLUMBING SUPPLIES
Crane Comoany, 2d and Brannan Sts., S. F.
P. F. Howaru Co., 2d and Folsom Sts., S. F.

POTTERY
Steiger Terra Cotta and Pottery Works, Mills Bldg., S. F.

PULLEYS, SHAFTING, GEARS, ETC.
Meese and Gottfried Company.....San Francisco, Seattle, Portland and Los Angeles

PUTTY
P. F. Virgin Co.....713 Brannan St., S. F.

GEORGE PETERSON G. HAZELTON WILSON

PETERSON & WILSON

JOBBING, STORE AND OFFICE FITTING
Contractors and Builders
TELEPHONE FRANKLIN 4877

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Western Pacific Railroad..Mills Bldg., S. F.

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Iroquois Iron Works (Barber Asphalt Company) .....Head Bldg., S. F.

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Marsh Brothers .....Call Bldg., S. F.
Meurer Bros. Co.,.....630 Third St., S. F.
L. B. Hooker Co...1530 Howard St., S. F.
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Fibrestone & Roofing Co., Mutual Savings Bank Bldg., S. F.
Genasco Ready Roofing, sold by Parrott & Co.....320 California St., S. F.
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Mackenzie Roof Co., 425 15th St., Oakland.
Meurer Bros. Co., A. H. McDonald, Coast Representative.....630 Third St., S. F.
H. D. Samuel Company, 1054 Monadnock Bldg., S. F.
United Materials Co.... Balboa Bldg., S. F.

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J. A. Drummond, 422 Chronicle Bldg., S. F.

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Dunlevy & Gettle....79 City Hall Ave., S. F.
Hibernia Sheet Metal Works, 219 Seventh St., S. F.
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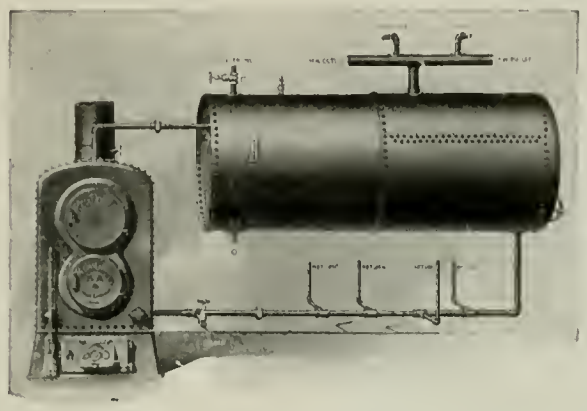

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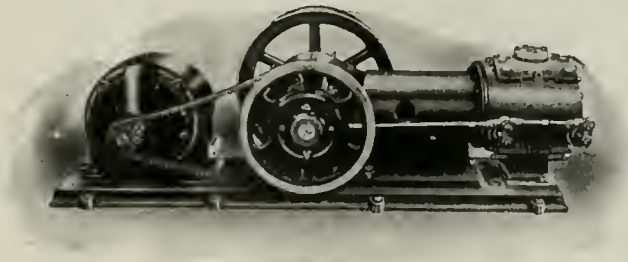

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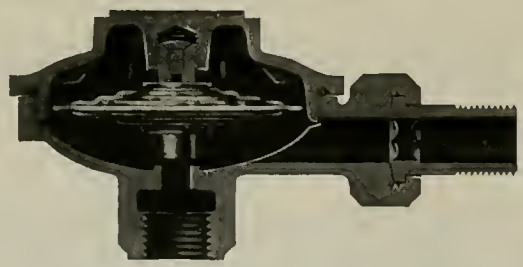

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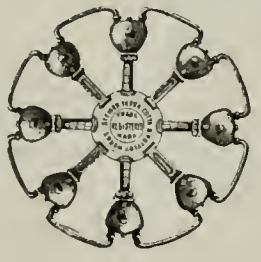

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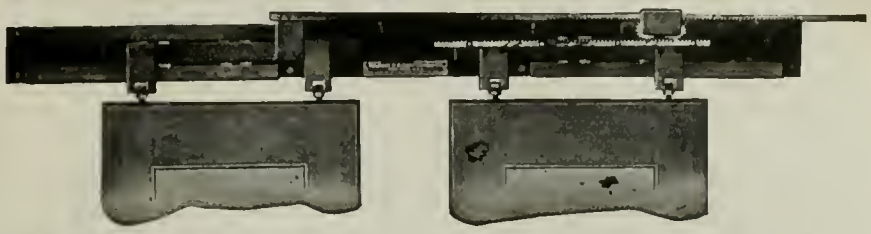

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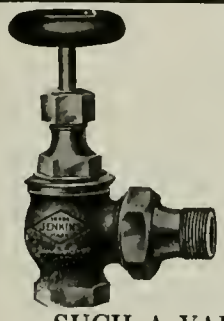

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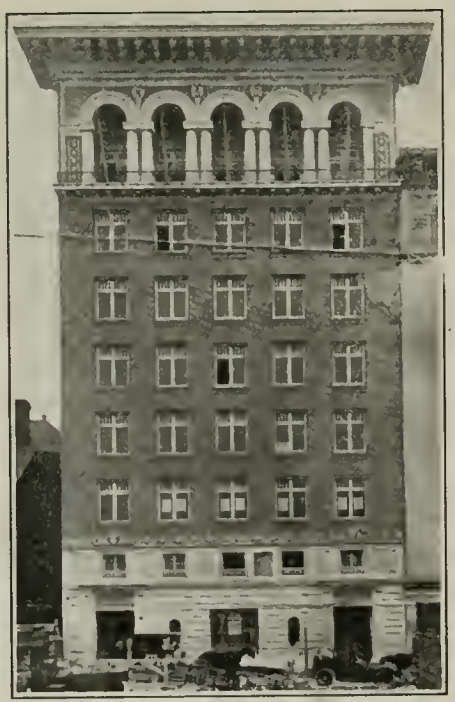

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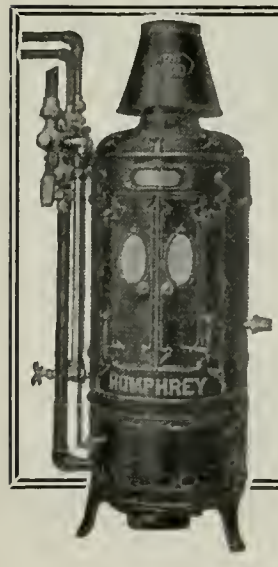

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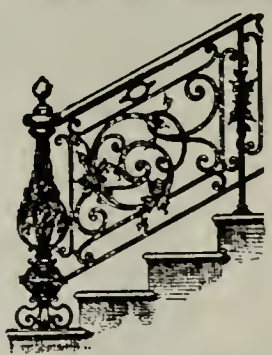

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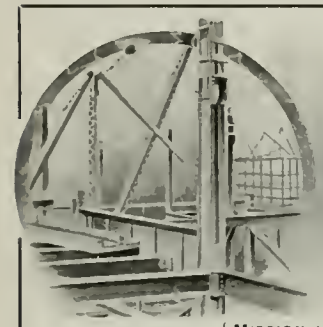

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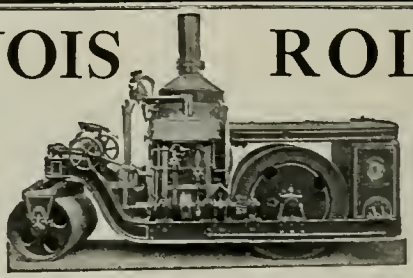

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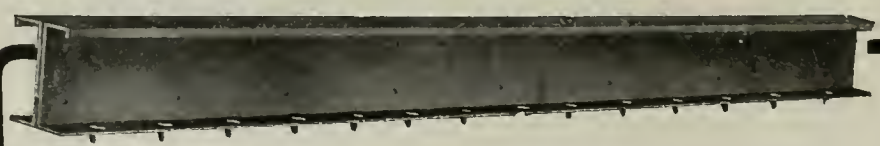

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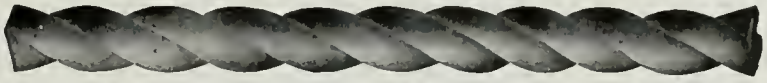

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D. H. Burnham & Co., Architects
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Frontispiece
The Architect and Engineer of California,
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Architect and Engineer
Of California
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The Development of Architectural Terra Cotta on the Pacific Coast*

By OSWALD SPEIR

THE development in the manufacture of architectural terra cotta on the Pacific Coast has been phenomenal; due first, to the remarkable growth of the different centers of commercial activity and population and secondly, to the rapidity of the acceptance of this material as the logical medium of expression by the architect, for the exterior of high class buildings.

San Francisco, leading in general commercial development naturally demanded the first so-called sky-scraper and in the Chronicle building we find the response. Designed by the father of sky-scrapers, Daniel H. Burnham, trained through experience in the logical and economic use of materials, we find this building clothed in clay—trimmed with architectural terra cotta. Quickly followed the Crocker building, designed by Mr. A. Page Brown, an architect and artist, who developed in the office of McKim, Mead & White, on the eastern ocean a knowledge and love for clay as a medium, for its color and plastic possibilities. The Mills building and its other great rivals were soon created, until we have in San Francisco not only the earliest examples of the use of architectural terra cotta on the Pacific Coast, but in its later development some of the finest examples in the world of its technical and artistic possibilities.

The opening up of the great resources of the Northwest repeated the demand for appropriate commercial housing in Portland, Seattle, Spokane and the other great cities which surround them, and here we find San Francisco's experience followed in the use of clay products.

And then from the south there looms in meteoric splendor the great city of Los Angeles, almost exotic in its sudden demand for merited recognition; and as she pushes her great buildings skyward we find them too, clothed in architectural terra cotta and the city glorious in her mantle of white and soft gray.

The lack of local stone of satisfactory color and quality and the comparatively high cost of outside stone has somewhat increased the demand for architectural terra cotta; but the quick response and the intelligent co-operation on the part of the Coast Clay Products Manufacturers, to the demand of architect and owner has done more than anything else towards the

*Architectural terra cotta for all the buildings illustrated in this article furnished by Gladding, McBean & Co.

Yeon Building, Portland, Oregon. Reid Bros., Architects
White Matt Enamel Terra Cotta

establishment on a permanent basis of this now indispensible material. Carefully drawing from the experience of the East, and studying intelligently each problem in technique and esthetics, as it arose, our manufacturers produce a material which is unexcelled in body, color and texture. Terra cotta lends itself with equal facility to the covering of the steel frame or the surfacing of a reinforced concrete structure; a careful and intelligent study of structural details by the manufacturer should solve safely and with due regard to unit proportion, each problem in construction and design.

The almost unlimited color palette capable of production in soft matt enamel, within the range of commercial reasonableness, has already brought forth some very creditable so-called polychrome schemes in exteriors. The range of possibility in this development of permanent color effect is so broad; the knowledge and familiarity with its use through precedent and practice so limited, and the result, be it good or bad, so permanent, that fortunately "Angels" who "dare to tread" are few and the mistakes fewer. The examples of the use of polychrome in exterior on this Coast are limited and almost without

Entrance to Los Angeles Athletic Club Building. Parkinson & Bergstrom, Architects
Architectural Terra Cotta by Gladding, McBean & Company

Entrance University Club, San Francisco. Bliss & Faville, Architects
Dark Buff Standard Terra Cotta

exception in good taste and appropriate: averaging in their artistic success with the several very excellent examples of this treatment which we find on the Eastern Coast and in the Middle West. Technically, the medium is at hand—esthetically we shall hope for its thoughtful, yea, reverent employment—or disuse.

The plastic nature of this material offers unlimited possibility in form and the manufacturers, as development demands, are drawing to their studios, artists, sculptors and modellers of appreciation and talent, and we already find in many of our buildings not only the evidence of the well trained modeller but of the inspiration of the artist and sculptor.

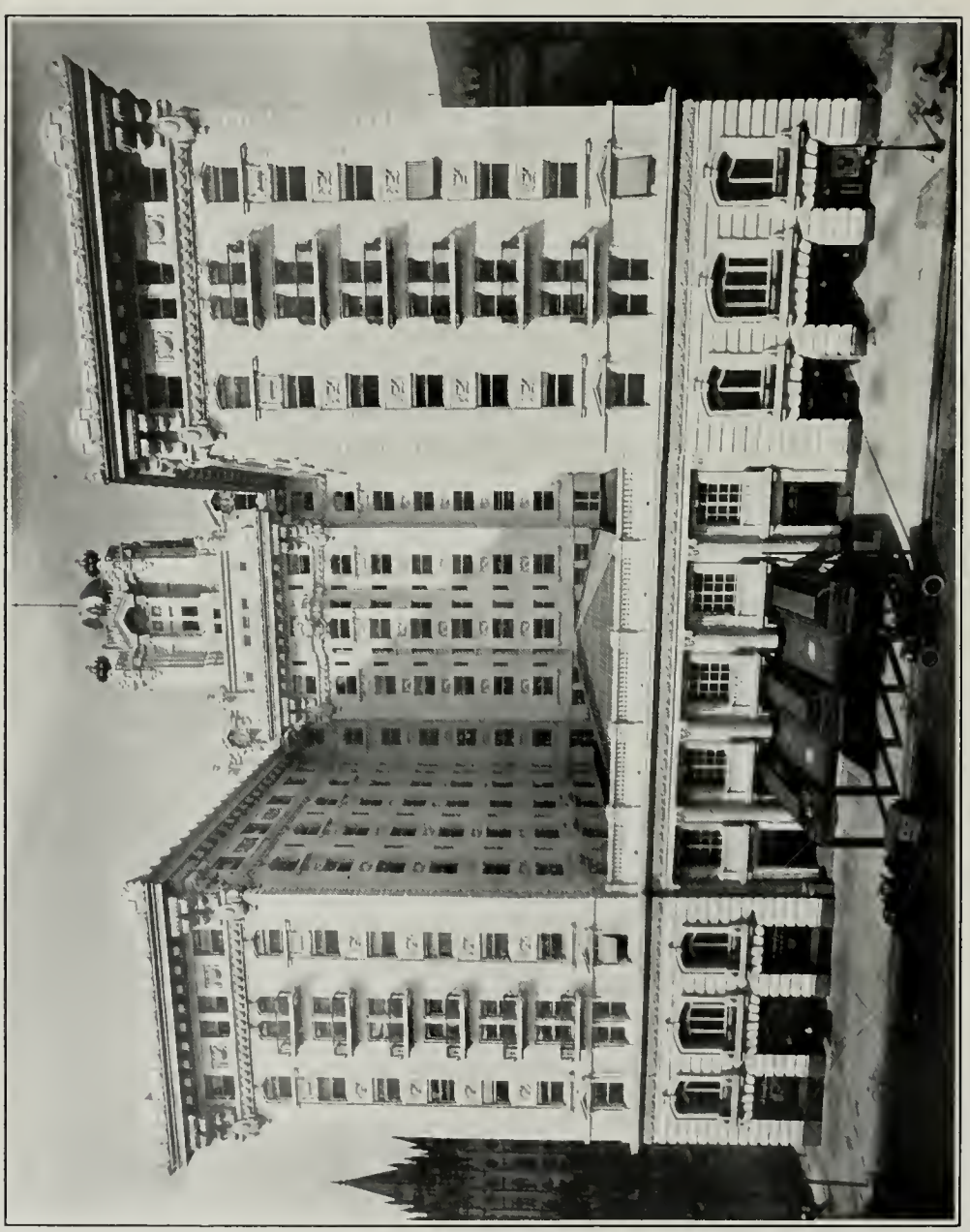
An illustrated history of the development of this industry in its finished and erected products would be of intense interest, but perhaps a very

Kerckhoff Building, Los Angeles. Morgan & Walls, Architects
Cream White Matt Enamel Terra Cotta

few of the more recent examples will serve to fix the possibilities and range of architectural terra cotta.

In the Old National Bank of Spokane, Washington, by D. H. Burnham & Co., architects, we find architectural terra cotta lending itself to spectacular speed in the construction of the sky-scraper. Fifteen stories of the material were set in seven weeks—the contractors working continuously and without interruption on their time schedule. A similar example is illustrated in the Yeon building in Portland, by Messrs Reid Bros., architects of San Francisco, where again fifteen stories including the main cornice completely of terra cotta, were erected in seven weeks. In this latter building a very interesting example of the proportion of the block or unit is developed and the jointing scheme throughout is admirably studied with regard to surface and architectural form.

In the Los Angeles Savings and Trust building, designed by Parkinson and Bergstrom, the housing of a great fiduciary institution with the superimposed office building, the problem is well solved. Monumental and classic in form, the base easily and naturally carries the shaft



Utah Hotel, Salt Lake City, Utah *White Matt Enamel Terra Cotta* *Parkinson & Bergstrom, Architects*

or office structure above, while the two upper stories separated from the shaft by a well marked horizontal band resolves itself into the entablature in pleasing proportion. The building is in white matt enamel architectural terra cotta from granite base to coping to parapet. Particularly interesting from a technical standpoint is the construction of the great columns in the lower stories, the arris between flutes having an added member accommodating a hidden back joint, and allowing the drums of the columns to count practically as single sections.

Another solution of the column problem is well made in the entrance to the Balboa building on Market street, San Francisco, which structure Messrs. Bliss & Faville, the architects, have conceived in the period of the Italian Renaissance and developed in fine proportion and exquisite detail. The entrance columns are broken at proper intervals with fillets or bands, serving to hide or kill the possible plastic line of the material.

Another most charmingly designed work in well studied detail and plastic modelling we find by these same architects, in University Club in San Francisco.

The Newhall building at the corner of California and Battery streets, in San Francisco, by Mr. Lewis P. Hobart, architect, is a most interesting and sane treatment of the office building in clay materials. The well proportioned piers are strongly marked by the use of a red stock brick of good tone and texture, while the horizontal demarkations are sufficiently heavy to tie the mass into well balanced relation of perfect proportion.

Hamburger Department Store Building, Los Angeles
Alfred F. Rosenheim, Architect
Cream White Lustrous Architectural Terra Cotta

Newhall Building, San Francisco. Lewis P. Hobart, Architect
Cream White Standard Terra Cotta

Entrance Balboa Building, San Francisco. Bliss & Faville, Architects
Standard Terra Cotta in Dark Buff

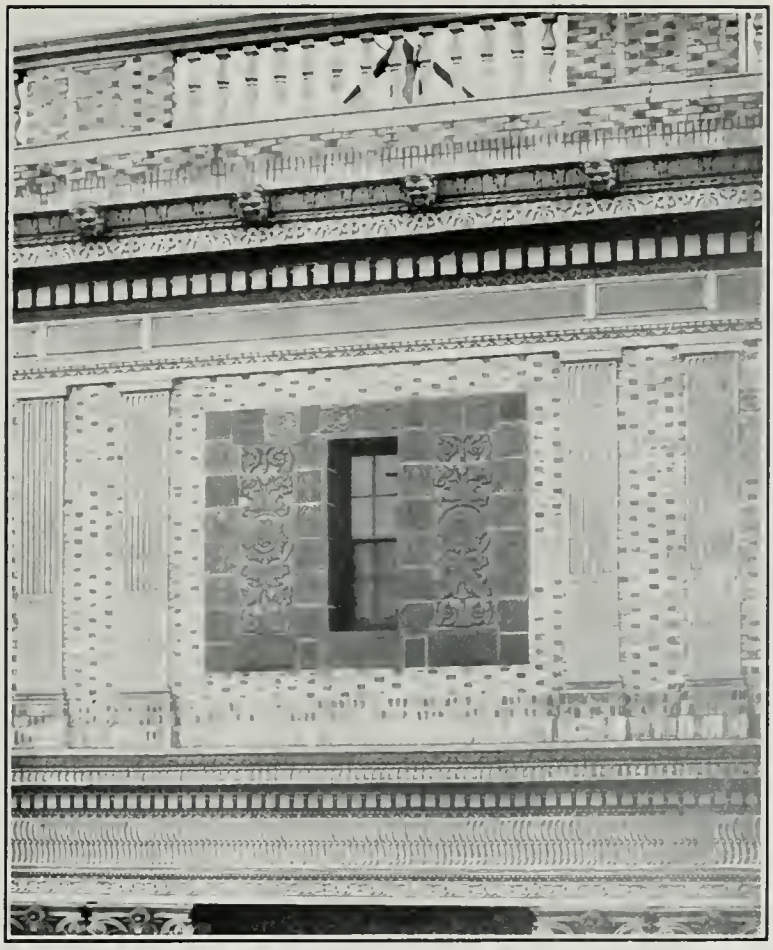
The detail and modelling throughout show careful thought and study, while the elaborately modelled figure frieze at the ninth floor deserves more than passing notice. Modelled by a sculptor of note, the late Domingo Mora, it is a lovely echo from the spirit of the Della Robbias.

From the inspired brain of this same Mora we have the group surmounting the entrance of the Los Angeles Athletic Club. The group standing free, is well proportioned to the entrance and surrounding architecture and quite naturally, develops from its pedestal. The central figure, a perfectly proportioned young athlete, stands squarely upon his feet, convincing and satisfying in the strength of his physical development. The flanking figures carry well the line of proportion and balance. Mr. G. Albert Lansburgh took advantage of Mr. Mora's talent in the four panels in the facade of his Orpheum Theater in Los Angeles in his clever

Hearst Building, San Francisco. James C. Green, Architect
White Matt Enamel Terra Cotta with Polychrome
Treatment at Entrances and Lower Stories

interpretation of the spirit of vaudeville. In this, among the best of Lansburgh's buildings, we find a legitimate and very interesting use of color. Restraining himself to its application principally to the enhancement and emphasis of his ornament, the effect is very rich and beautiful on the mass of warm grey which forms the surface. The panelled soffits to the great openings, colored in low tones, add depth and charm to the reveals.

And we could wander up and down the Coast and into the inland cities and find on every hand much of interest, more of mental profit, and some pleasure; but most of all, encouragement for both architect, artist and manufacturer.



Detail over Central Body of Facade, Columbia Theater, San Francisco
Bliss & Faville, Architects

their beauty, as well as for their measurement, their accommodation, their financial return, might with a little more study and thought be equally famous for some distinctive mark of character and color.

In some such order as this does the story of the peoples who enrich their buildings with color appear upon the pages of history, and it is wonderfully supported by the testimony of the various ruins in different localities. First the Egyptians and following the Persians, Assyrians, Greeks—for even in the frieze of the Parthenon were traces, probably of color, discernible—the Etruscans, Chinese, Jananese, Mexicans, Peruvians, Arabs, Moors and Turks. There are doubtless also to be found buildings by the Gauls, Germans, Scandinavians, Goths, Huns and Vandals, where color formed a large part of the architectural scheme.

In a most remarkable manner did the localities barren of costly marbles resort to clay, fired and glazed, as a color-bearing agent. There is about everything that has gone through the fire an engaging air of mystery. This is doubtless inspiring to the imagination and difficult to explain, clay bathed in

Facade, Columbia Theater, San Francisco
Bliss & Faville, Architects

glazes and fired was a child of an enchanted world, puzzling and elusive perhaps at times when veiled with a thin glaze, but promising great things.

The harem at the Palace of Khorsabad, at Niniveh, Assyria, had walls of enamel brick, covered with colored enamel. There were six colors: blue, yellow, green, dark ochre, black and white. The decoration was of the clearness which was highly prized by the Assyrians; blue forms the background of the ornament.

Decoration was also painted on the plaster at Knossos and color by various agents is also to be found in the Abbey Church of St. Savin near Poitiers and St. Anastasia, Church of Verona.

No wonder the Pisans decorated their churches with the bowls and basins captured from the Saracens, because of the wondrous lustre of their surface. The Gate of Justice, at Granada, the Cathedral at Amiens, depend largely for their interest upon their color, the tones of the latter being vivid in the extreme, bright vermilion red glazed, crude green and orange, yellow, ochre, black and pure white. Occasionally blue appears. The façade of the Palace of Justice at Cologne is enriched with mosaic, also the Ca'd'Oro of Venice, the Miniato Al Monte, Florence, St. Mark's, Venice. One of Giotto's pictures shows a white building crowned with a bright scarlet cornice, and bearing semi-circular panels with mosaic in geometric patterns upon the wall spaces, and so it goes.

The student of the Orient has many such examples before him. For instance, he knows the blue, the green and the red mosque, and he knows them because of the extreme beauty of their domes and minarettes. Travelers speak eloquently of their quality to sparkle and shimmer in the sunlight. They tell

Entrance Detail, Children's Hospital, San Francisco
Bliss & Faville, Architects

us that the picture once seen is never forgotten, and that it has stimulated writers and poets, providing a perfume for many a description.

During the last few years, considerable attention has been given to the subject of textures and various devices have been resorted to whereby interest in the plain surfaces as well as interest in the architectural detail, has been greatly enhanced, whatever the style or the character of the building. Study of material has for the moment, in many cases, persuaded the architect to become, as it were, a craft-worker, busy with the fascinating nature of clay products as well as of the tenants of the hillside, rich in oxides, veined upon the surface of marble, or held suspended, as it were, in granite-like formations.

The secret of these glazes—scarce thicker than paper—could surely be rediscovered by our industrial chemists and manufacturers were interest sufficiently stimulated in this fascinating subject. Given one iota of the attention and thought to this question which has characterized the equipment of the engineering side of the architect's knowledge and his grasp upon building problems; and once again will the sky line of a modern city reflect insistently the cultivated taste of a great people.

Regarding the treatment of plain glazed surfaces there is much to be said. There seems to be in the minds of some manufacturers—and I fear at times it is shared by certain architects—a desire to so highly finish the surface of terra cotta as to invite the idea that it is intended to be a copy of stone or of marble, or a delicately enameled surface without flaw or texture. Glazed terra cotta is no imitator! By no stretch of the imagination can anyone be justified in accepting it in this light. To think of it for one moment as a reproduction or copy of another building material must surely be realized as

Colonnade and Portico Entrance, Children's Hospital, San Francisco
Bliss & Faville, Architects

a serious mistake, a grave error of judgment. Terra cotta, be it glazed, semi-glazed or unglazed, has its own individuality, its own language, its own character. It is as individual as any cube cut from the quarry of any hillside and should be so regarded in the realm of architecture. It is scarcely necessary to recall the enthusiasm of the Della Robbia's and the wild, tireless search by Palissy, the potter for glazes and modelling adapted to receive glazes. This is a matter of cultivation—of appreciation—if you will; not a fantastic and capricious fancy of the moment.

This means that the color may be mottled? It does. Take for instance a series of quoins or dressings for the corner of a building or window or door opening. Each block has been separately moulded and dipped or "sprayed," to quote the jargon of the workshop, and it has also been separately fired. (Modern science has of late busied itself to determine the exact temperature of each tenant of the kiln without making much headway.) It is as distinct a unit of the building as it well can be to have come from the same working drawing and be moulded from the same strata of Mother Earth. Is it unreasonable to ask that its individuality be respected? Does anyone want to regard it as a mere foot or so of a given enrichment, be it cap, entablature, architrave, cornice or what not? It must, of course, conform to the same rule, line up with and become part of the constructive whole and be subservient in other ways to the general scheme of the design, but forever it will remain individual. Its face may bear some quaint markings, memories as it were of a high temperature in the fierce struggle. Metallic oxides frequently vary, according to the position of oxidization in the kiln. All this is delightful. Of course there is a limit to this kind of thing and there are certain ceramic changes which are legitimate and others that are not, but are rather the result of careless workmen. The diversified tone might become an affectation, and poor and careless work could be passed off on the plea that it were really a caprice and only a caprice of the kiln. This, of course, must be guarded against.

Glazed terra cotta adapts itself to the seriousness of a monumental or of a picturesque theme. The Renaissance of the Italian revival shows many grandiose conceptions of surprising dignity and simple grandeur, and this without in any way appearing to imitate stone or marble.

The lovers of color have for many years been disturbed by the continued greyness and dullness of the façades and demand something to enliven the life of the man out of doors and offset the monotonous commonplace that confronts him.

Beyond doubt, the coloring of architectural ornament for the sake of additional emphasis is a study by itself demanding the keenest attention and unusual knowledge of a specific kind; a composition may please today and yet grievously disappoint in a year or two. The climate has a different effect upon different colors. Not that they fade, but that the deposit of carbon from the smoke neutralizes some colors without having much effect upon others; for instance, a middle-toned blue, red or purple will withstand the attack for many years, dulling perhaps and generally blackening, while ornament made up of white, yellow, buff, light green, all run together and becomes too often flat, dull, anæmic and uninteresting, if not even unintelligible, viewed even from a few feet. It is this kind of information which is alone to be secured by visiting buildings some ten or fifteen years of age, where the chemical action of the climate can be studied on the site and the situation more easily understood. Again, the question of distance from the sidewalk or elevation counts wonderfully in the arrangements of the pallete, and the quality of the color to be introduced is also important.

Some days ago it was my privilege to note an interesting skyscraper crowned, as it were, with a golden coronet. Yet it was a very simple composition; the coronet was a deeply covered portion of a frontage, paneled with or-

ange colored terra cotta blocks. In its position it would never harbor dirt, but would always remain bright and cheerful. Deposits of soot were not likely to dull its surface. The rest of the building was a light tone buff.

From the "luxurious miracles," as Pliny calls them when he names the grand antiques, the Breche Orientale, the Skyros and the Campan Vert of the Pyrenees—rich marbles—from them must the architect look for knowledge of color likely to be of service, and to them will he naturally point the manufacturers of terra cotta.

He will not, however, forget the lustres by Maestro Giorgio and he will, doubtless, if he belong to this favored country, however, recall the triumphs of opalescent glass—color glaze in another form, nor will he be blind to the memory of that preparation of clay and glass which appeared under the name of ceramo-crystal or vitreous mosaics, wherein the low-toned surfaces of some of the duller types of marbles are recalled.

These dull surfaces are extremely valuable, they do not disturb the effect of the solidity of the wall, nor do they separate, as it were, from the composition as a whole. They are not disturbing, they express the language of the architect uniting carving with moulding, and are valuable in a hundred ways, forming as they do a rare change in texture, introducing color without a glassy divorcement, which ennobles and makes happy in a soothing and comforting way. Such changes are of great value where economy has to be studied.

This low-toned color bearing, vitreized, sandy surface is very hard and dense. It is imperishable, much of it having stood from the times of the early Romans as pavements in exposed positions. Almost anything reasonable can be done with it. It can be made in slab or tile, about a quarter of an inch thick, and it can be broken in fragments so that the fractured edge enables it to furnish a key to cement. Or it can be cast as projecting mouldings. Tesseræ—broken fragments of various shapes—form delightful borders when used in connection with marble or stone, or brick; indeed by some they are very skillfully introduced into walls of concrete. In brief, this material also is simply glazed under another classification, made under other conditions, wherein the mystic charm of metallic oxides is swayed by the madcap goddess we know under the facetious name of color. Yes! a right glorious thing is color.

Semi-transparent glazes enabled the early toys of the Egyptian children to retain a recognizable shape; man is still toying with clay, the material of which the best of us are made.

In this he has doubtless been splendidly assisted by the manufacturers of brick, these gentlemen having attacked the subject firmly and with vim, often extracting from the most unpromising clays bricks of a wonderful color, red, buff and cream fired at the ends a dark purple. Indeed this making of brick is one of the great industrial triumphs of a victorious age. The diversified texture, however, is of greatest value for low buildings whose frontages can readily be washed down should the smoke-begrimmed atmosphere deposit its carbon upon them, choking the cells and neutralizing their tender shades. Tall buildings require glazes, glazes that protect, being transparent and thin without altogether concealing the body of the clay. This semi-opaque effect is extremely valuable and too little understood. By some subtle device the industrial chemist has drawn, as it were, a thin veiling over the rough surface of the body, permitting it to peep out in places and,—as if by some fairy caprice he has skillfully added more color in some places than in others, so that the body is permitted to take part in the scene. Such semi-glazed surfaces are of inestimable value when used in connection with the rougher textures of brick which are devoid of glaze. They also lead up to and enrich the opaque colors where the tone is solid and vigorous.

There are doubtless a thousand and one means whereby decorative contrasts may add interest to large surfaces when viewed from a distance.

As a general rule it goes without saying that the smaller the surface the more brilliant must be the color. Still a discussion on this subject can hardly be undertaken here. Its opaqueness and transparency are important. For some unknown reason preference has been given to what is known as matt surface. Tones of white with this treatment are very satisfactory—so far as they go—but the addition of color gives life to the whole thing, particularly if it be brilliantly glazed. At times the vividness of luster or majolica is needed. This is one of the charms of terra cotta, adding comparatively little to the cost, yet it is everything to the picture. It requires knowledge and pluck to lay out the scheme of, say—a projecting string course overhanging cornice, pediment, tympanum, or even cap in brilliant colors—colors that shall sing as jewels in the distance! And the average architect is scared at the result, when confronted with the samples in his office. It takes years of experience to tell just how such detail will count in the façade when seen at an elevation of two, three or four hundred feet on a dull day!

It is with no little pleasure that I learn from reliable authority of the experiments now being made by a leading sculptor, possibly, I should say, the principal sculptor of this country, in adding to his work the interesting element of color. Just what success has been made is a secret! Just what direction and effect he is striving for, remains also to be discovered, but of this we may rest assured, that if but one-half of the skill that has characterized his work hitherto be devoted to this craft, we all shall be greatly enriched. It is perfectly natural that we should look to the sculptor. Was it not the Della Robbia's headed by Luca of that name, who first conceived the idea of adding to his work a color note of great charm? Is it not the sculptor whose grasp is so immediate and direct who usually helps us in our need, for he knows the value of accent and just where to stop?

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An International Building Exhibit

PLANS have been completed for the international building exhibition to be held at Leipsig from May to October, 1913. It is expected to demonstrate the surprising progress which the art of building has made in the past twenty or thirty years. The official participation of foreign governments and the great influx of foreign visitors anticipated, especially of state and municipal officers and experts, will afford exhibitors superior opportunities for making valuable connections. The classification plan for exhibits embraces eight sections, as follows:

(1) Architecture.

(2) Literature of architecture and building; technical educational institutions; office requisites for architects and engineers.

(3) Building materials, their manufacture or preparation and use.

(4) Machines, tools, and apparatus used in building.

(5) Sale and purchase of building land; building finance; estate agencies; insurances in connection with dwelling houses; bookkeeping for builders and architects.

(6) Sanitation for dwellings, factories, and streets; protection of workers from injury, first aid and other provisions for their health and comfort; precautions against fire; old-age and invalid insurance.

(7) Gymnastics, games and sports.

(8) Testing of building materials, technical demonstrations.

The exhibits in the various groups may include parts or actual buildings or constructions, and demonstrations as well as models, drawings, photographs, and other appropriate representations.

Further information concerning the exhibition may be secured from the management, No. 1 Windmuehlenweg, Leipsig, Germany.

Detail of Upper Stories and Dome of Humboldt Bank Building, San Francisco
Frederick H. Meyer and Smith O'Brien, Architects
Terra Cotta by Steiger Terra Cotto and Pottery Works

Terra Cotta

By W. E. DENNISON
President Steiger Terra Cotta and Pottery Works

IN the rocks of the earth that have gone through volcanic fires the inventive genius of the ancient builders many centuries B. C., found the secret of an enduring material for many of the most splendid structures of Greece and Rome. They took plastic materials of the earth's surface, fashioned them into designs and made miniature volcanoes in which to burn and harden them. They produced **baked earth** which we call by the more euphonious name of **Terra Cotta.** They applied these forms of baked earth in such variety of design to their most splendid buildings as to have kept the architectural world busy ever since in merely copying them. It is fortunate for the weak imagination of the moderns that these works of the ancients have perfectly endured to the present time. To find any lasting material other than **Terra Cotta,** that so readily lends itself to the hand of art in architecture, is the despair of mankind. What the fire leaves, the fire will not destroy. San Francisco has everlastingly attested the truth of this. All of her Terra Cotta buildings erected before the greatest conflagration known to man, still stand as enduring monuments of the kiln. If you would know perfectly the full meaning of the Kiln's bold defiance, which its all-fired children hurl at unrestrained holocausts, you need but look at such buildings as the Rialto, Monadnock and Grant. They are shown elsewhere in this issue. They are a few of the all-fired children of the Kiln, "upon whose bodies the fire had no power," like Shadrach, Meshac and Abed-nego of old. They walked unscathed from the burning fiery furnace. "Then the King promoted Shadrach, Meshac and Abed-nego."

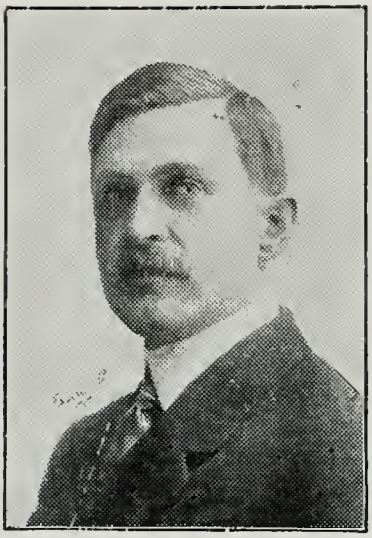
* * *

On the opposite page is a splendid plate showing the upper floors of the Humboldt Bank building, San Francisco, in detail. This building represents the first architectural terra cotta contract let in San Francisco after the fire. Many architects are under the impression that the exterior finish is sandstone instead of terra cotta, so faithful is the imitation.

California Pacific Building, San Francisco. Reid Bros. Architects
Finished in Richmond Red Pressed Brick furnished by
United Materials Company

Use of Materials in Construction

By NATHANIEL ELLERY C. E.*



IN recent years the types of construction have undergone marked changes caused undoubtedly by the attention directed to monolithic work. In strictly engineering structures this feature is certainly carried to its fullest extent and we need but review recent works to satisfy ourselves on this point. In buildings this idea is also carried out, but other items of positive requirements are so prominent as to overreach much of the monolithic feature scheme. For instance, fire resistant materials are of the highest importance as are also those materials giving most space with sufficient strength to perform the work required of them. Resistance to lateral stresses caused by outside forces must now be properly sought. Then architectural features are of the utmost importance and at the present day this treatment is bound to be of paramount consequence.

It is the materials and forms of construction of buildings to which I shall mostly confine this article. The intention is not to give a strictly technical account of construction, but to give a general resumé of the work, note many everyday facts in practice and yet to go sufficiently into technical information that wrongful conclusions may be avoided. For those readers not familiar with many terms used, I shall endeavor to state plainly the subject matter.

As the property values of our cities advanced it became necessary to so construct the buildings of the congested districts as to give all available space for revenue purposes. The stone and brick walls used structurally on building work when height was desired, became too thick for practical purposes and it was then that steel, a material of great strength, entered to permit height to be obtained. The first steel framed skyscraper was erected in the City of Chicago. From this has grown the structural steel frame for building until we now have under construction in New York City the Woolworth Building, a fifty-five story structure, seven hundred and fifty feet in height. For the frame of a building steel enters as the best resistant to stresses, lateral or otherwise. It must, however, be fireproofed or else its value in a fire or conflagration is extremely low. When properly fire-protected it presents the most modern and best material known for structural use. From tests made by the Federal Government it shows the greatest rigidity of all building materials. Another factor of great value in steel design is the uniformity of the product, thus allowing for a safer design than of other materials used structurally. In comparison with reinforced concrete thus used, it occupies considerable less space in the columns so that a main room having column supports will give more floor room. To be sure we must in good construction fireproof the steel and it should be thoroughly done, but must not concrete receive the same consideration?

The progress report of the American Society of Civil Engineers dated March, 1910, states that reinforced concrete used structurally must be fireproofed. In the discussion of the report Major Sewell, who is extremely well versed in this class of work, offers some good suggestions on the liability of

*Manager Brick Builders' Bureau, San Francisco.

insufficient protection to the reinforcing metal. The imbedded metal of reinforced concrete must be protected from excessive heat, so that the structure shall not fail. After calculating a column, beam or slab and placing the metal of reinforcement near the tension side, or the side liable to be stressed with tension, there should be at least two inches of concrete as a fire protection. This extra concrete should be beyond and over the figured cross section of the member, for should a fire or conflagration attack the member, dehydration and spalling will occur for the two-inch depth. Then how shall we replace this destroyed surface? We who have experienced the difficulty of attaching new concrete to old know what it means to repair such material or make the proper junction of the new and old concrete. Understand when dehydration takes place it is a chemical breaking down of the real strength of the concrete mass. Undoubtedly in first-class construction reinforced concrete should receive proper fire protection. In the minds of many, whenever a material is noncombustible there seems to be immediately established the idea that it is fireproof. Fireproof does not simply mean that a material will not burn, but that in addition it is a protector against fire. Frequently one will notice the label of fireproof on a building when, in fact, it is not much better than a firetrap. Modern fireproofing in building construction has reached that stage where all materials are so arranged to assist to prevent fire from nearly every point of attack. The structural parts are surrounded with a resistant material, windows are in metal casings, wire glass is used, doors are metal, the trim is metal, elevator shafts are enclosed, hallways are protected by fire doors and the whole plan tends to limit an interior fire to a certain unit. Today after looking over our enormous fire losses it seems almost incredible to think of erecting buildings, the walls of which are either brick or concrete and the interior is of wood. The certain test will come upon this improper fireproofed building and then will much criticism be heard of the construction, when at this date those who have at all studied the problem are sure of their ground. The ordinary fire develops between 1500 and 2000 degrees F. of heat. Concrete dehydrates between 500 and 1000 degrees F. As the heat penetrates the mass, it loses its intensity, and yet with a wooden interior which means in case of fire an intense heat, the walls will be destroyed. Should the brick walls be properly constructed the wood may burn out without destruction to the brick, as it is a material not deteriorated by the heat of such a fire. With such construction we must build our real fireproof buildings doubly well in order to resist the outside hazard.

The most inconsistent thing I have seen done in concrete is to erect structurally large warehouses and store buildings to hold much inflammable material without properly fireproofing the concrete, and then labeling the building fireproof. Again, in erecting power houses of reinforced concrete where electricity is generated or used, provision should be made to avoid possible electrolytic action in damp concrete.

The highest type of structure, that is, steel frame properly fireproofed, reinforced brick curtain walls with cement mortar, and partition walls of porous hollow tile will not cost any more than concrete properly handled and be superior as a building and fire resistant. It is far cheaper to build fireproof, but extremely difficult to show that a 10 to 25% extra on first cost is a better investment than the original cheap plan. Look at the insurance rates, maintenance or upkeep, and the comparative shorter life of the structure. In the struggle to get a cheap construction we overlook much, and therefore get inferior work. Frequently it is amusing to note the cuts demanded in a plan by a client whose opinions are formed largely through vague notions, clever advertisements have brought to his attention.

Much well directed advertising has placed concrete into the position of adaptability for the construction of every known need. Much experimenting and discussion has been carried on and still it remains a material in need of much well ripened judgment in its use. Failures are occuring without stop, creating losses of life and property. In the face of this you find advocates demanding even lighter work. The making of concrete is a chemical process and needs care and attention, but usually the cheaper labor is employed to mix and deposit the material. This mistake is a serious setback to the material and those people permitting of flimsy, skinned concrete construction are positively jeopardizing future work.

Let us go back for a few years and determine a few changes. In the early stages concrete was mixed "dry," rammed into place until the water flushed to the surface; then came the reinforced type and very wet concrete was the order of the day to thoroughly enclose the reinforcing metal. Now the best practice demands a mushy concrete so that it will not run so readily. Under the sloppy-mix plan the cement became flooded, latence formed and my observations on different work plainly convinced me of these weak seams in the work, destroying monolithic construction and practically destroying the general plan of reinforced concrete. I have personally knocked off great slabs of beam concrete on account of these very seams. Today look at the various concrete walls exposed to view and trace the floor lines on the outside of the building where the pour of concrete stopped and then continued, a line of cleavage not as strong as the body of the wall and a point of leakage. Examine closely the walls and you will find them greatly cracked unless enough reinforcing metal is used to prevent shrinkage and temperature stresses. This extra metal causes an additional cost and ordinarily is not used in building work.

The University of Michigan has experimented with change of volume of concrete and deduced some extremely valuable information. However, it is hoped the line of experiment adopted by these people may be continued that we may get much needed information on concrete construction. They found that ordinary concrete shrinks in air about twice as much as it expands under water. The first uses of concrete was below the ground line, such as foundation work. Here it amply justified its use and engineers and others undertook to extend this use to various constructions where cement is less stable. It proved so successful in damp places by its non-shrinkage that it was unthoughtfully used in above ground constructions, cured in dry air, where conditions were directly opposite. Shrinkage took place with the consequent internal stresses of which designers took little or no cognizance.

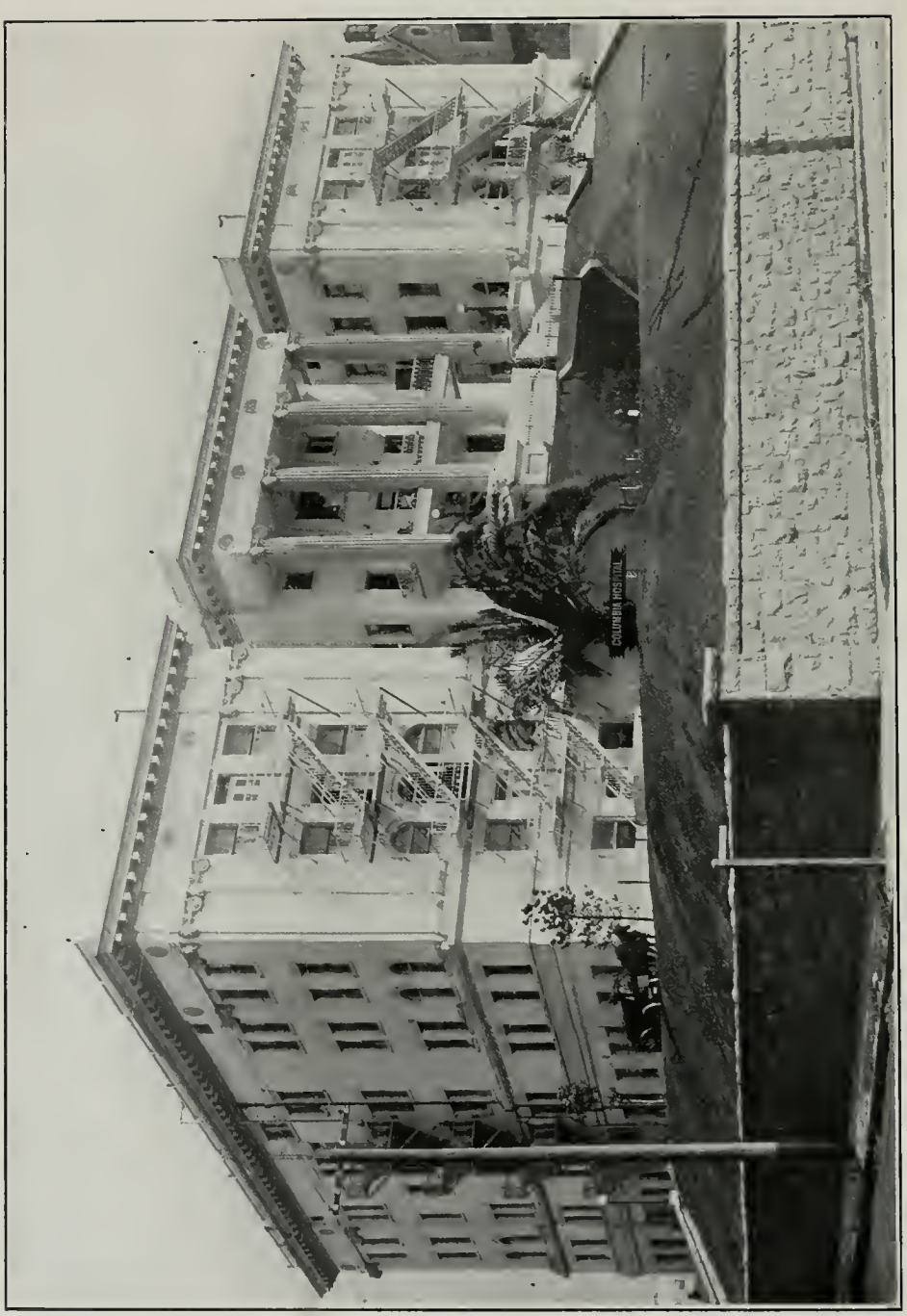
Much information has been obtained on concrete. Much more must be obtained in order to get the work of more uniform grade. Few engineers have had the chemical training to study thoroughly this chemical material, the value of which rests so largely in its make, design into work and its handling in the execution of that work.

The wet and dry stresses have only lately been investigated. Emerson in 1904 determined approximately that reinforcing metal in concrete cured under water has one thousand pounds of tension per square inch of metal. In air the stress is approximately twenty-five hundred pounds of compression in the metal while the tension of the concrete in which it is weak is sufficient to demand the attention of the designer. Again it was found the leaner the mix the less the expansion or contraction. This leads us directly to the use of mortars, their action and the proper consistency of them.

Cement mortar of one part of cement to one part of sand is rich and strong but when it sets in air numerous cracks of shrinkage take place. Reduce the mortar to one part of cement to two or three parts of sand, and in setting the

Fire House, San Francisco *Loring P. Rixford, Architect*
Exterior of Tapestry Brick and Terra Cotta

Los Angeles Athletic Club Building, Los Angeles, Cal.
John Parkinson and Edwin Bergstrom, Architects
About 1000 Tons of Hollow Tile and 175,000 Cream Pressed Brick furnished by Los Angeles Pressed Brick Co.



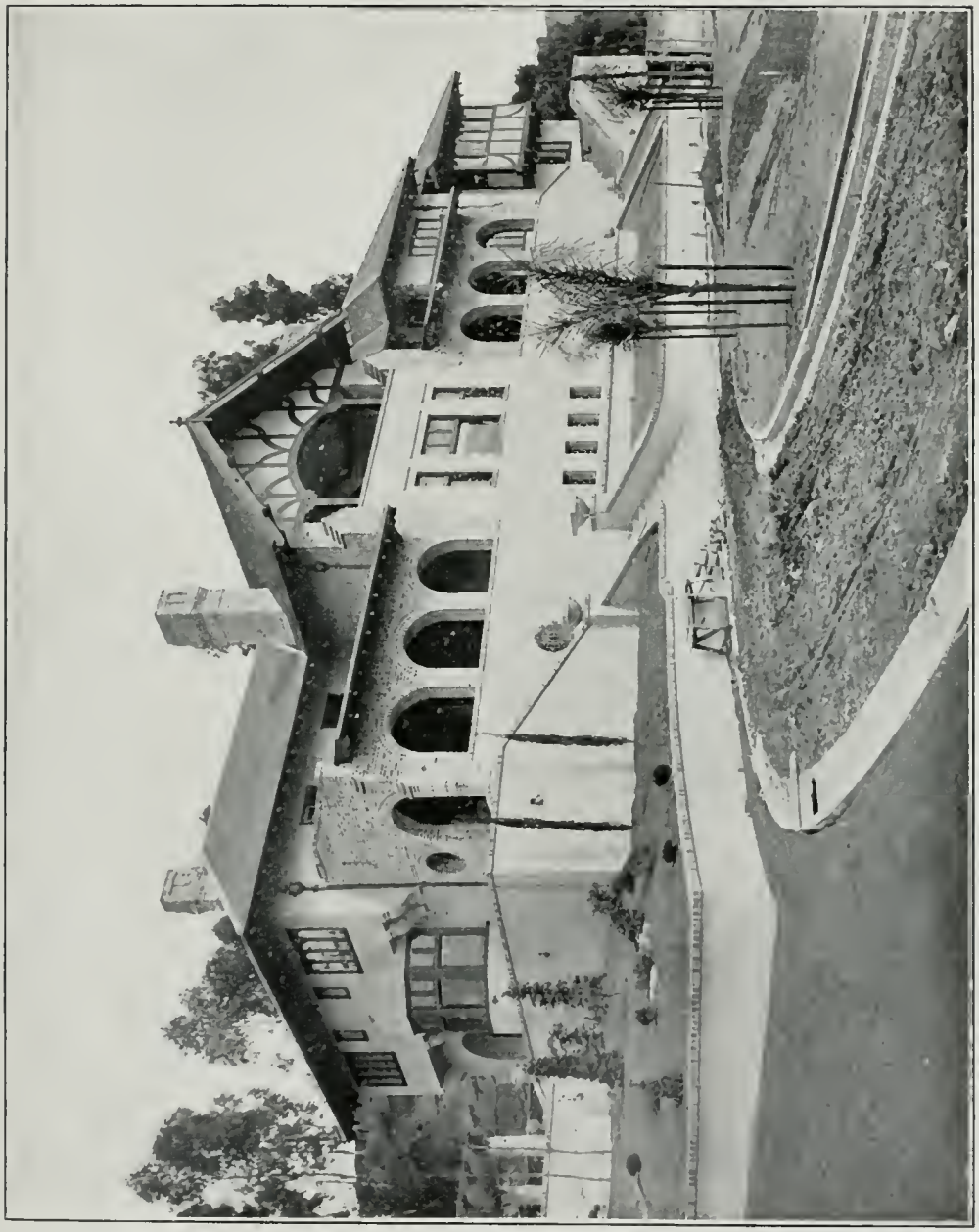
Columbia Hospital Building, Built by General Osteopathic Association, Los Angeles, Cal. Norman F. Marsh, Architect.
About 1000 Tons of Hollow Tile and 175,000 Enameled Brick furnished by Los Angeles Pressed Brick Co.

County Museum Building, Exposition Park, Los Angeles, California. *Hudson & Munsell, Architects*

200,000 Red Ruffled Brick — 1,500,000 Hollow Common Brick — 110 Squares of Red Spanish Roofing Tile furnished by Los Angeles Pressed Brick Co.

Masonic Hospital, San Francisco *O'Brien & Werner Architects*
Red Pressed Brick by United Materials Company

Showing Pergolas and Mission Tile Roof of the Hart Residence, Claremont. C. W. Dickey, Architect
Tile Roof Furnished by United Materials Company



J. L. Giroux Residence, Hollywood, Cal. *Frederick L. Roehrig, Architect*
25,000 Tan Ruffled Brick, 45,000 Shingle Roof Tile, Furnished by Los Angeles Pressed Brick Co.

Residence at Santa Cruz, California *William H. Weeks, Architect*
Tile Roof by United Materials Company

shrinkage cracks are greatly reduced. You have undoubtedly noticed large patches of cement mortar finish on the exterior of a concrete building flaking off. Perhaps for two or three years it remained intact and then began loosening and breaking away from the base or body. The junction between lean concrete of the body of the work and the richer cement mortar of the finish firstly did not have a proper bond, then when the mortar alternately wet and dried, the action broke the bond at the line of least resistance and the flakes dropped off. The main body of concrete should be cleaned of all loose flakes torn by stripping the forms and the surface left rough if we are to finish with cement mortar. Do not use rich exterior finish, but comparatively lean, and finish the surface in dash work or rough that the small shrinkage cracks will not be disagreeable to the eye. If brick walls are to be finished with cement mortar plaster, rake the joints that the mortar may key itself and reduce the liability of flaking. In both instances be sure and wet the walls well before the application of mortar. For cement finish to floor slab of concrete, the mortar again should not be too rich. The slab should be thoroughly cleaned and water soaked before the application of the finish. In damp basements in the shade, you have noticed how well the top finish acts without cracking, and in the story above in the drier air, cracks show. Shrinkage is taking place and it must show in the low tensile strength of the cement mortar. If we could get a material which in setting in the air did not change its volume, we would thus produce an ideal condition.

For brick work, if we had a cement mortar of one part cement to two or three parts of sand and about 10% addition of lime paste for fattening, we may make a wall that will be as strong as the brick. You cannot get a brick from the wall without breaking it. I have constructed such work on a steel frame with the result that the brickwork was equal to any monolithic construction.

It is remarkable the mortar we use. The ordinance of San Francisco today makes lime mortar one part lime to not more than five parts sand measured dry. Cement mortar is one part cement to not more than three parts sand. A combination mortar of lime, cement and sand shall be one part of cement to not more than six parts of the lime mortar. Let me here present some facts. It requires about three volumes of sand to one of lime paste to allow the paste to surround the particles of sand and fill the voids. The volume of the resultant mortar is just about equal to that of the sand. Where this mortar is used

in thick walls, the mortar may be many years in setting, as the air is excluded and the carbonic acid has only reached a portion of it. Therefore, in thick walls, cement mortar is preferable, both for strength and complete set, as the chemical action takes place in the interior of the mass equal with the other portions. Discussion on mortars always brings forth many views, but it is a well known fact from tests and experience that lime mortar tempered with cement increases in both adhesive and cohesive strength as the volume of cement increases. For this reason I wish to call to the attention of builders a scheme for the classification of structural mortars, grading them up to cement mortar of about the mix, one cement, two and one-half sand, and lime 10% for fattening. From personal observation of much mortar in brick work, it is my earnest belief that a plan of classification would be of vast importance in rating brick work. Let the standard be cement mortar and the other classes reduce to lime mortar. This is vital to the builder, to the owner, and to the manufacturer. It would give standard brickwork of such high character that poorly poured concrete giving junction lines at the point of stoppages in pours and porous concrete could not be classed in comparison for homogeneousness and continuity of strength.

At this point I would suggest and recommend some municipal authority to exercise a power over brickwork construction to see that each and every contractor lived up to the class of work specified and make each job fit the value anticipated. This may seem a trifle premature, but I think not, because any construction needs the strictest attention and sometimes heroic measures are necessary to accomplish results. What we want is the work as stipulated, honest measure in the buildings.

Today in San Francisco we are building many steel frame structures with curtain walls of reinforced brick eight inches in thickness, and wisely, too, for in good hard burned brick we have the best fireproof material extant, a material that goes through fire and comes out unharmed in strength. The curtain wall of this material is better able to resist external fire. Should the heat be sufficient to destroy the mortar between bricks, such occurs but about one-half inch deep. This can be raked out and pointed at a minimum of cost. A curtain wall of concrete subject to the same heat would dehydrate about one and one-half inches in depth, then how shall we replace the deadened material. This ever present question of making two pours of concrete adhere, is one of the stumbling blocks to the monolithic idea. We must take this as it is. Perhaps at some later day we may perfect concrete deposition so that we may avoid such annoyances. Right here let me give you a lesson on these two walls. While the forms for the concrete walls are erected to the roof line in one case, the reinforced brick wall is completed to that line in the other case. With the high priced skilled labor and the brick wall as against the cheaper labor on the concrete wall, there can be effected a saving of from 10 to 15% in cost on the reinforced brick construction over the other wall. Are not these features worthy of consideration when a better fireproof wall is given in reinforced brick and cement mortar and its rigidity as tied to the steel frame will resist lateral action equal to any construction known.

In this connection it may be explained that the reinforcement of brick curtain walls on steel frame consists of vertical rods not less than one-half inch diameter spaced twenty-four inches on centers. They penetrate the center of the eight inch brick wall and are fastened to the frame properly, either turning over the rod ends or placing nuts on them where they pass through the madeup section of steel. Erect a steel frame building, make the walls of reinforced brick, fire proof the structural parts, make your floors of slab construction and the work need not delay to wait for the material to cure. Concrete

floor beams are treacherous during the first three or four weeks after they are cast. They are new and weak and certain tensile stresses are developed. From observation it seems that the tensile stresses reach a maximum in about three months although the concrete gains strength long after this period. The volume changes have also reached their limit in about the same period. Just when to remove the forms is a question depending upon the rapidity of curing the mass. However, several weeks should elapse before their removal as local conditions may affect the time necessary for self-support of the work and prevent partial unseen and indeterminate rupture. Many times have I seen forms removed from beams, then after a few days vertical cracks occur penetrating the beam to its neutral axis. Remember these forms were left on four weeks before removal. Structural steel does not require any such care. It goes into the work ready to assume stress immediately—no wait for curing—no fear of removal of forms prematurely. In fact it is made off the job, delivered, simply riveted into place ready to do its work. Again note the inspection—steel making and rolling is watched by experts while reinforced concrete receives no such close scrutiny during formation.

From the structural part of the building we may pass to floor construction and determine some of the features dominating this work. With the manufacture of steel, wrought iron shapes and cast iron columns, brick arches were constructed springing from the lower flanges of the beams with a span of three or more feet. This plan did not protect the lower flange of the metal beam so that when a fire occurred the beams gave way dropping to destruction the whole floor. From brick arches there was tried arched corrugated metal in the same relative position as the brick. Over this metal was filled a lean concrete for the floor and again unprotected metal beam flanges during fire precipitated the floor to destruction. Then came buckle plate flooring of heavy cast iron dished in the form of a flat arch and set between beams two or three feet apart. On these was poured concrete for the floor but the same unprotected metal resulted in disaster in fire. Sometimes buckle plate was of wrought iron and was largely used for heavy construction as factory plant and warehouse work.

Hollow tile then became a material for floor arches. Many schemes were devised and much floor construction done along these lines. Upon the greater use of concrete there was adopted the reinforced concrete floor slab. This work seems to have met with general demand and great latitude has been given recent work of this nature. Again the tendency is to lighten the slab. This is wrong. There is positive need of a thicker slab, fireproofing the metal on the tension side of the slab. Surely most of us have walked over a floor of reinforced concrete construction and noticed cracks indicating the line of beams beneath. This is a defect which should be remedied but how can it be done. Reinforcing metal must be placed over the beam and near the top of the floor as much tension occurs here. Then tell how we shall keep the air dried concrete from shrinking, a requisite to prevent these unsightly floor cracks. A few years ago I placed a large thin slab of reinforced concrete as a dam facing in which there was enough metal to take up temperature stresses but along the edge of the slab occurred shrinkage cracks in the concrete proper. The old brick arch plan of floor construction will prevent these unsightly cracks but the expense is greater than the concrete slab plan.

The brick man knows well that his product used in walls adjusts through the joints, temperature, etc., and only unequal settlement of foundation or excessive exterior forces will cause rupture cracks. No doubt where sidewalk lights are required for our city buildings brick arches will give tighter and more stable work than concrete. You see the close attention given these lights in order to make them watertight and then regard the far lesser movement of

St. Pauls Episcopal Church, Oakland. Benj. G. McDougall, Architect
Richmond Red Ruffled Brick

Interior St. Pauls Church Finished in Richmond Red Pressed Brick

the brick arch work and its superiority for this point becomes immediately apparent.

Another important item that goes to make for good work is the class of partition walls. Porous hollow tile is the best wall material in use today. Brick is excellent but heavy and concrete has not only the same objection of being heavy but additionally is solid and therefore more resounding than hollow tile. Plaster on metal laths or wire mesh is much used but is a very poor fire retardant. Hollow tile should not be the hard burn. In the building of a partition of tile on each course there should be spread a layer of galvanized wire mesh as wide as the thickness of the whole tile so that the mortar will key itself into the hollow openings of the tile and thereby strengthen the wall and give it much rigidity. The old plan allowed the mortar only on the thin shell and webs which structurally was of little value. The scheme quoted above, however, does away with clips and gives excellent and practical results. All tile partition work should be constructed with the strips of mesh. The hollow tile when of proper dimensions, not hard burned, and set up with a good bond in the best fireproof and practical partition wall we can construct. Improper tile, set snug against a beam without allowance for an expansion for great heat may buckle and cast off allowing of no protection. The fireproofing of columns and beams with wire lath and plaster has but little value, concrete is good but tile will give best results. In case some of the tiles spall they may be taken out and be readily replaced with a minimum of expense. In concrete fire proofing, should it dehydrate the whole protection must be replaced.

An extremely interesting study in concrete work is the various schemes to take up temperature stresses with expansion joints, and heavy metal reinforcement. There seems to be very divergent ideas about this matter but it has some features the solving of which are important. How can we plaster a long straight concrete wall which is bound to crack unless expensive steel reinforcing is used to offset temperature differences. I have experienced such a plight and can not keep the plaster from showing ugly cracks—an expansion joint is of no value as it is made to move—therefore the plaster cannot be continuous over the joint. Brick walls may be handled without this trouble. In engineering works proper expansion joints are used but in buildings where a unit or the whole structure may be subjected to an intense heat from fire may not an internal rupture occur on account of unequal expansions due to excessive heat at one point and air temperature simultaneously at another point. Here is opportunity for study between steel and concrete structurally used.

The waterproofing of both brick and concrete walls has received an enormous amount of study and experimentation. External paints, washes and cement finishes have been applied, some partially successful, others of little value and still again others without any merit whatever. Many schemes for waterproofing concrete by mixing in the mass some emulsion, powder or other material have been tried. Frequently we hear of a success of this or that mixture but let us look at the matter from a practical point of view. Watch the erection of a concrete building, note the porosity in walls and various parts. What good will the internal mixture do. I have experienced this. Certainly in a laboratory we may get good results but just as certainly on the work the conditions are not the same. We must fill up the porous concrete to make it damp proof or else we must pour dense concrete with practically no pores. Many arguments on porous concrete are indulged in where it is subjected to alkalies in engineering work and for building work it brings out the following facts for avoidance. Be sure the water for the mix contains no alkaline salts and that the aggregate has no ingredient that will mix with an alkali as failures have been known to occur for these reasons.

It is for the architect to determine his materials to carry out his views. Today we note the use of veneer brick on concrete buildings and we should look over the field and see the more artistic structures. Take those of concrete and then those of brick, on the one hand we have one material of practically one color, on the other we have a material of various shapes, sizes, and colors capable of many combinations. The modern manufacture of brick has brought into the market a material which has no superior as a fireproof and fire resistant, capable to withstanding when hard burned and built in pier for test with neat cement mortar a compressive stress practically equal to that of cement mortar of a one to one mix and much more rigid.

The first cost of construction has much to do with the use of materials but not always does the owner by this plan profit. Quite frequently, shortly after completion of a building it is necessary to go to some expense to remedy some defect. Then to get this matter properly fixed he spares no expense but must have the repair or change done without delay and at an expense which certainly makes his cost go beyond an original good construction and does not give him a first-class job. Have you not seen this happen. There is no question about cheapening construction on account of first cost. Deep consideration should be given this matter and for permanent investment it must be avoided on strictly business lines.

We need good designing and good honest execution of work for good results. Nothing short of good clear architectural and engineering skill and judgment will produce good design. In execution we need honesty, business intelligence and sufficient skill to carry out the intent of the design.

I have endeavored to bring to the attention of the builders and laymen some vital facts concerning construction. If in such course I have simply directed their attention to study of a problem affecting our whole civic makeup the effort has its value.

* * *

Production of Brick

From the Los Angeles Builder and Contractor.

The manufacture of common building brick in Los Angeles has reached enormous proportions, so much so that the yards are being worked to their fullest capacity to keep up with the demand. This condition has been brought about by a scarcity of surplus stock which heretofore the manufacturers have been enabled to have on hand at this time of the year. The reason given, is that on account of the lateness of the spring they were not able to accumulate much surplus stock over and above their daily deliveries. This condition, however, is being gradually overcome so that within the next two weeks it is fully expected that a sufficient surplus stock will be on hand for all purposes. A number of large brick school buildings have been erected since the beginning of the year which has had much to do with the present condition, as in a majority of them as many as 2,000,000 brick were required for each.

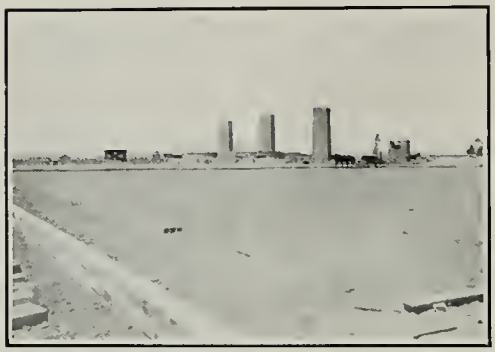
The price of building brick in Los Angeles has been commented on all over the United States as being the lowest of any large city. This is more from the result of competition than from any other cause.

* * *

Striped Paint

A paint manufacturer recently received the following letter: "Gentlemen:—Will you please send us some of your striped paint. We want just enough for one barber pole."—Southern Textile Bulletin.

A Mammoth Vitrified Clay Pipe Plant



General View of Plant

WHAT will be the largest and most completely equipped vitrified clay sewer pipe plant west of the Mississippi river, is being constructed by the Pacific Sewer Pipe Company of Los Angeles at Los Nietos, a town 12 miles south of the Angel City, at the junction of the Santa Fe, Southern Pacific and Pacific Electric railroad lines. There are about 30 acres under development and some idea of the immense size of the plant may be had from the statement that it will be equipped with 28 thirty-foot downdraft kilns with a capacity of producing enough sewer pipe to supply all of Southern California's needs for years to come. The company at the present time is supplying most of the material used in Southern California.

The pipe is made in sizes varying from 3 to 36 inches in diameter and 2½ feet in length. About one-third of the Los Nietos plant has been completed. The pyramid-like walls shown in the illustration are stacks over 40 feet in height and built of common brick lined with fire brick. There is one of these stacks to every four kilns. The main building of the plant will be 660x200 feet with two press rooms 40x70 feet and a power plant 45x110 in addition, and will be built of clay products exclusively. The plant will be operated by electricity generated by a Kerr turbine of the most modern type.

The new plant is situated in the center of an excellent clay belt from which all the necessary material is at hand, thereby lessening the expense of hauling which has been somewhat of a handicap heretofore. The improved accommodations will probably mean that pipe can be sold for less money in the future. The plant will be operated by natural gas and oil—both of which are within easy reach.

Showing Forty Foot Stacks of the Pacific Sewer Pipe Company's New Plant under Construction at Los Nietos

In addition to producing large quantities of sewer pipe, the Pacific Sewer Pipe Company supplies practically the entire Coast with clay conduit for electric wiring, telephone wires, etc.

Clay Pipe Used to Protect Piles from Parasites

A New Use for Vitrified Clay Pipe

ENGINEERS employed in the construction of new wharfs at Terminal Island, San Pedro, have been experimenting with considerable success with vitrified clay pipe as a protection to piles from the destructive parasite. Heretofore, it has been necessary to creosote the wood piles to protect them from the ravages of the teredo and linoria. This is an expensive process and those engaged in the work have long been endeavoring to find a less costly substitute.

In vitrified clay pipe, it would seem that the problem has been solved. These wooden piles are covered with 14 or 16-inch clay pipe, the pipe being placed over the piles as soon as they are driven and allowed to sink with their own weight into the mud at the bottom and the space between the pile and the pipe filled with sand, a material that is particularly disliked by both the teredo and the linoria.

Experiments in a small way were made several years ago and examinations made recently of the piles showed that they were in perfect condition. The Pacific Sewer Pipe Company of Southern California, whose pipe has been used in these experiments, is very well pleased with the outcome and it would seem that a new field has been opened for vitrified clay products.

The accompanying illustration is made from an actual photograph taken of the piling recently completed at Terminal Island, San Pedro.

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* *

A Twelve Mile Vitrified Clay Pipe Line

THERE has recently been completed in Southern California one of the longest private vitrified clay pipe lines on the Pacific Coast. A remarkable feature of this line is the fact that it runs for three miles above ground, a condition made necessary in order to keep it to grade as the last three miles must be carried over tide water.

In the marshy section the pipe is laid on vitrified clay piers filled with concrete. The total length of the line is twelve miles and the pipe has a circumference of twenty-four inches. The accompanying illustration shows part of the line built above ground. The line is intended to carry off all waste from the Southern California Beet Sugar plant near Santa Ana, the outlet being the Pacific Ocean at Huntington Beach. About every one thousand feet a box with gates has been built with the idea of eventually diverting the drainage for irrigating purposes to the adjoining beet sugar fields which are owned by private parties.

When this pipe line leaves the factory it is some six or seven feet under ground and when it has reached its terminus, it is above ground level. It is estimated that the pipe will last for all time. It was manufactured by the Pacific Sewer Pipe Company of Los Angeles.

Cut Shows Vitrified Clay Pipe Line Built Above Ground

Brick and Publicity

By the HON. JOHN B. ROSE*

SINCE the time we first heard of little Johnny Jones we have learned that advertising pays, and yet like Rip Van Winkle, who slept in the clay-covered hills of the beautiful Hudson, we rest, calmly facing the fact that slowly, irresistibly, a new material has been driving us out of the market, and that this inferior substitute has been taking the place once so firmly held by us. It is because we know the value of the material we manufacture, that I believe it is time we should raise aloft our standard, and under wise leadership, charge the citadels of the enemy; lead back this defeated, straggling, disorganized army, and turning a rout into a victory, rally round the standard, "back to brick."

Publicity is the only thing which will meet present day conditions. We know that we have a material which is the best. Why not let the world know it? Millions of dollars are spent yearly in advertising destructible products, while we have thought so little of our product that we have hesitated to make known its good qualities. We have been suffering with a cancerous disease. The publicity of cement and the increasing use thereof has been slowly eating away our manufacturing bodies.

Do you know that concrete construction is not indestructible? Do you know that it is not inexpensive construction? Do you know that, except in small, cheap and criminally unsafe structures, concrete buildings cannot be built as quickly as brick? what, then, is there about concrete construction which has given it such an impetus throughout the country? Why do you see a vast amount of concrete construction in many towns throughout our states, if it is not cheaper; if it is not indestructible; if it is not fire-proof; if it takes longer to build a house of concrete and if it is criminally unsafe, why has its use been greater day by day? Why has the cry, "Cement is king" been taken up? Why such articles as these "Outlook, Feb. 17th," "Spectator?"

There is only one answer:

Publicity. A liberal use of printers' ink. And think what an opportunity we have. Here are concrete dams giving away; concrete buildings falling down; concrete bridges caving in, and all around us, on all sides, life and property destroyed, because of the criminal use of concrete. And what use have we made, as an industry, of this ammunition which has been placed in our hands?

Of what use, do you think, the concrete interests would have made of such ammunition? If through the use of an inferior quality of brick one house should fall, it would be flashed from one end of the country to the other, and the world would have been terrorized into the use of concrete.

Cement is King! Yes, in the same sense that "Dodo," a well advertised comic opera king holds sway over the people of the play. Think of it! A king of concrete, which, heated by the fires of our attack, would crack, and when the flood of newspaper criticism is turned on it, would disintegrate and fall to pieces as a useless waste. Why, concrete, instead of being king, is only a deuce spot in the deck, with all the tricks of the knave.

I have said that concrete is not indestructible. What of brick? Why, one of the chief complaints of the manufacturer has been that when buildings are wrecked in the city and whole blocks razed to give place to greater improvement, the old brick, *i. e.*, second-hand brick, are immediately placed on the market in competition with the new. It is impossible to destroy them. An amusing incident was told of one of the prominent builders of New

*Paper read before the National Brick Manufacturers' Association, Chicago. Mr. Rose's address is New York City.

York. He was tearing down an old building preparatory to erecting a dwelling house for himself. His superintendent was anxious to make a record for himself, so as the walls were thrown down he carefully cleaned all the old brick and piled them in the rear of the lot. The owner came around one day and seeing the pile said to the truckman: "Say, Tom, if you have any use for these you may take them," as the owner did not care to use any second-hand material in his own house. Tom took the brick, carted them to an empty lot a few blocks away, piled them up and counted them. Some weeks later when figuring on his job the owner cussed his purchasing agent for the high price of brick. The latter informed him that there was a scarcity and that it was difficult to get good ones at any price; but, said he, "I have an opportunity of purchasing some first-class seconds, almost as good as first quality, at $5.75 per thousand delivered." "Why, take them, you d—— fool, take them!" said the boss. Whereupon the agent called up Tom and told him he would take the seconds, and Tom hauled back the 60,000 at $5.75 which the boss had given him. The superintendent, recognizing these as the identical brick that he had cleaned up, fearing the boss, protested to the purchasing agent. About two days later the builder came around and seeing his own seconds back in the job, a greater part of them having been used, said to the superintendent: "Where in —— did you get these brick? What in —— are you using those for?" "Why," said the superintendent, "the purchasing agent told me that you told him to take them." "Why," said the boss, "the d—— fool told me he could get some seconds, and I thought he meant new brick just a little off—not second-hand brick, you never can destroy the damn things."

What about second-hand concrete? Did you ever see any? Is there any difference between the indestructibility of brick and concrete?

I have said that reinforced concrete is not inexpensive construction. It is a well-known fact that only in cases where the cheapest kind of unskilled labor can be used in building frames, forms and moulds, connecting up the reinforcements, etc., is there anything, so far as expense is concerned, in the favor of concrete, and in most instances there is a balance on our side.

I have said you cannot build as quickly of concrete, and if this is so, this, too, is a great element of cost when the rents are a severe and large item. In one instance, in the City of New York, a building was erected on a plot where the rental value was $280,000.00. The concrete buildings, according to figures of the owners, took about six months longer to erect than it would have taken to have erected a brick building, making a loss of $140,000.00. To sum up in a word, an inferior form of construction, with inferior material, which does not save any money, which is, at best, only an experiment, which in most cases is criminally unsafe, is preferred over the only indestructible, fire-proof material against whose use no word has been said. Why? Because we, its creators, have stood still; and not until we have allowed the concrete interest to get a start, so that now, like a glacier, though moving slowly yet carrying all before it, do we awake. If we wish to break up this glacier and destroy its effectiveness we must McNamara our way through it. Conditions such as these demand heroic treatment.

Having briefly reviewed conditions and having diagnosed our disease and found a remedy, let us see first how it may be employed to get the best results in the shortest possible time.

Public opinion is the creator of public works. Arouse the people and convince them that they are being tricked and they will turn upon those who have deceived them and rend them in twain.

Last year the manufacturers of the Hudson Valley determined that they would begin a campaign of publicity; nothwithstanding the fact that they

had gone through two years of hard times, they raised $5,000.00 for immediate needs and pledged to the committee such other financial assistance as might be required, provided, of course, the original investment demonstrated the wisdom of the plan. We found we had a serious problem right at hand. Under a proposed act of the legislature a new charter for the City of New York was authorized and a committee had been at work upon the draft in anticipation of the enactment of this law. An inspection of the proposed code revealed the fact that someone had curiously left out the word "brick" in the construction of piers, footings and in certain walls—that concrete, concrete blocks and other inferior substitutes were specified; in a word, that about 50 per cent of the work where brick had been formerly used, concrete or some other substitute was specified. Rather serious, was it not? An annual demand of about 1,000,000,000 reduced to 500,000,000. Up to date the code has not been put through; it would have been slipped through had it not been for the watchfulness due to the increasing interest in our plan of publicity. The next proposition we faced was an advertisement by the city for the construction of twenty-one fire houses and a number of police stations of concrete—no brick. We immediately took up this task, and suffice it to say, the plans were re-drawn, specifications corrected and brick were called for and contracts have been awarded for brick construction—millions of brick to be used where concrete was to have been used. The next one, a much larger proposition, viz., brick construction in subways. It is true we have very little results to show for our efforts in this direction at present, but we can report progress, for already we have secured the use of brick in one section of the work where concrete had been specified.

I propose that we raise at once the sum of $100,000.00 proportionate subscription, if possible, to be based upon gross sales. The organization of a national executive committee to take charge of the same, with a managing member in each state; headquarters in New York and Chicago and some city to be later chosen west of this city. The employment of an aggressive, capable secretary and manager whose duty it shall also be to immediately visit any point where the collapse of a concrete structure is reported, secure photos of the same and such other evidence as might be obtainable from those residents of the town who might be willing to furnish valuable data; that in addition to this, a portion of the fund should be used subsidizing clay product expositions in the larger cities of the country, wherever the executive board might determine they should be held.

An aggressive fight for the use of brick today means the saving of thousands of dollars, yes, I might safely say, millions of dollars to manufacturers in the future.

This matter cannot be handled by the National Brick Manufacturers' Association or the Builders' Brick Association, which, by the way, I should mention here and commend for the valuable work that they have done, and which I feel ought to be encouraged by the international organization. Neither can this work be done by the International Clay Products Exposition Company. They have done a great work and are entitled to consideration, but the proposition which I stand for is one that is independent of every other movement of this kind which has yet been attempted. This money quickly appropriated and wisely expended over a period of twelve months will create such an interest in the "Back to Brick" campaign that anyone contemplating the erection of a building will be alive to the dangers of concrete construction, and the superiority of clay products construction over that of all inferior substitutes.

We can build a more beautiful structure. We can build more economically. We can build a house that will withstand the ravages of time; and in addition to that, we give a life insurance policy to the public—free of charge.

Why pay life insurance and at same time build structures of concrete which are unsafe and destroy life?

A fund quickly raised, properly distributed and wisely expended will bring to each contributor a harvest, a hundred fold.

But now is the time to sow seed.

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Brick and Tile Output Was $90,776,000 in 1909

Value of Product Increased 30% in Five Years

A PRELIMINARY statement of the general results of the 13th census relative to establishments engaged in the manufacture of brick and tile has been issued by Director Durand, of the Bureau of the Census, Department of Commerce and Labor. It covers building, fancy and ornamental brick, vitrified brick drain tile and any other brick-yard product.

The general summary shows increases in all the items at the census of 1909, as compared with that for 1904, except in number of establishments, which decreased from 4,634 to 4,215, or 9 per cent.

Capital invested increased 46 per cent.; the gross value of products, 30 per cent.; cost of materials, 45 per cent.; value added by manufacture, 26 per cent.; average number of wage earners employed during the year, 16 per cent.; amount paid for wages, 30 per cent.; number of salaried officials and clerks, 34 per cent.; amount paid in salaries, 54 per cent.; miscellaneous expenses, 35 per cent.; primary horsepower, 34 per cent.

The capital invested in 1909 was $174,673,000, a gain of $54,716,000, or 46 per cent., over $119,957,000 in 1904. The value of products was $92,776,000 in 1909, and $71,152,000 in 1904, an increase of $21,624,000, or 30 per cent.

The cost of materials used was $23,736,000 in 1909, against $16,317,000 in 1904, an increase of $1,419,000, or 45 per cent. The value added by manufacture was $69,040,000, or 26 per cent. This item formed 74 per cent. of the total value of products in 1909, and 77 per cent. in 1904. The value added by manufacture represents the difference between the cost of materials used and the value of products after the manufacturing processes have been expended upon them.

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* *

The Modern Elevator

The greatest development in building equipment within the past decade has been made in elevators used to carry passengers. A few of the improvements which deserve mention are the elevator entrances, which are now being closed by compressed air generated by the hoisting machinery in the shafts and controlled by a foot lever located in the operator's corner; automatic safety devices which will stop and hold a car which has become detached from the hoisting cable; an emergency lever, which will stop the descent of a car should the automatic device fail; dials which tell where the elevator is, and many great improvements in the cages themselves. A modern elevator of the improved type is as safe as the stairs upon which some prefer to mount to their destination.

Los Angeles is Hollow Tile Mad

IN no city on the Pacific Coast has there been such universal demand for hollow tile as in Los Angeles. In San Francisco most of the fire-proof buildings have reinforced concrete floors and metal lath partitions. In Los Angeles the tendency is to use hollow tile in preference to concrete. They are even building residences of tile, and experts declare it is possible to build homes of this material as cheaply as wood. W. C. Denison of Cleveland, Ohio, who, for several years, has given attention to the subject of the use of hollow clay tiles as a substitute for wood, writes:

"In communities where the proper kinds of tiles have been manufactured and the public informed as to the merits of this construction, it has been adopted with little short of wonderful rapidity. In Cleveland alone during 1911, 50,000,000 common brick have given place to tile. At the same time it has been demonstrated that it is nonsense to build a frame house when the "hollow tile stucco" house (or tile faced with brick) can be built at practically the same cost and is far superior in every respect.

"Hollow tile is the coming building material the country over. Timber is becoming scarce and suitable clay is abundant.

"Manufacturers of hollow tile claim that this material can be set up much more rapidly than concrete, and once in position, plastering and any other work can proceed without delay, while with concrete, the workmen are obliged to wait till it dries. Concrete is not suitable for partition work and metal lath and plaster is more likely to be affected by a hot fire than terra cotta tile, as the latter is subjected to the severest kind of heat in manufacture."

* * *

Tile Treatment of a New York Hotel

A reference was made in the last issue of the Mantel, Tile and Grate Monthly in regard to the Della Robbia room in the New Vanderbilt hotel at 34th street and Park avenue, New York City.

This room without exception is one of the finest examples of tile work in existence and a visit to the same will well repay all those interested in tile work of this description.

The treatment of this room is sky blue, cream and gold, and the architects Messrs. Warren and Wetmore, who have a national reputation, have spent a great deal of time and thought in designing this room in not only making the color treatment a striking feature, but also in demonstrating the great advancement which has been made in the use of tile for interior decorations.

Those who have been fortunate enough to have seen this room, are not only amazed but seem to be at a loss to find words adequate to express their admiration, and the tile work itself is an illustration of what can be done with this material by skilled mechanics.

The sky blue faience tile which was furnished by the United States Encaustic Tile Works was a specially manufactured dull blue of a particular shade, color and texture indicated and desired by the architects.

In examining this room one is struck by the great amount of study and thought which the architects have given it, and which is followed out throughout the entire hotel even to the detail of the door knobs which have medallions of wedgewood to correspond to the various color schemes with which the various rooms are identified, in fact, there is practically no building in existence that compares with the Park Avenue Hotel for its beautiful and most lavish decorations, and under these conditions the hotel is considered one of the marks of interest in New York City.

Value of Terra Cotta

LARGELY on account of its excellent qualities as a fire-proofing material and the readiness with which it lends itself to intricate and beautiful designs for building ornamentation, terra cotta is being more generally specified for the higher class construction than ever before. One point urged by architects in favor of terra cotta is the fact that it can be easily matched with any colored brick or stone and concrete.

The modern employment of terra cotta is a revised taste and the result of laudable efforts of architects to get lasting and honest ornamentation in lieu of sham effects procured through the use of stucco and galvanized sheet iron.

In faithfully made and vitrified terra cotta, we have the great and only lasting triumph of man over natural productions, for properly and thoroughly burned terra cotta will pass through the centuries, being not only fireproof, but also in all architectural employments practically time proof and indestructible. Good construction, next utility, and last decoration are the order in which the design should be carried out. The last requires an artist who is inventive enough to make the ornament harmonize with the purpose of the object and decoration in the place it is to occupy.

Terra cotta is clay, burned and re-burned in the process of manufacture. It is said its sound properties are superior to those of wood, either the porous or the closely aggregated material being used to line the walls to prevent sound from going through or to preserve a surface of neutral character, as the case may be, thus assisting and modifying sound.

A building faced with enameled terra cotta may be washed without difficulty, and this fact has been demonstrated frequently in this and other cities.

"The durability of terra cotta has been proved by specimens, preserved to the present day," one writer says, "conveying records of the earliest nations known to history. Its effectiveness in absolutely protecting the steel skeletons of 'sky scrapers' was demonstrated by the Baltimore fire. High compressive strength, combined with clearness of surface and lightness, add to its practical value."

The material was used for decorative purposes in Greece, Rome, medieval Italy, Pompeii and Etruria, most of the supply coming from the clay plains of Northern Italy. From those early designs came the latter ones in Great Britain, from the fifteenth century to the eighteenth, at which time its use was discontinued.

Little "stock" terra cotta is kept by manufacturers. The architects are given absolute freedom in carrying out their ideas on paper. These sketches are submitted for bids to the various manufacturers, exactly as building contract bids are asked. The lowest bidder makes models according to the design. Photographs are sent to the architects who make alterations or corrections.

Terra cotta is manufactured in many grades, the enameled being more expensive than the natural or rough finish, and the colored terra cotta costs more than the white.

* * *

Easier

A Chicago banker was dictating a letter to his stenographer.

"Tell Mr. Soandso," he ordered, "that I will meet him in Schenectady."

"How do you spell Schenectady?" asked the stenographer.

"Se—, S-c-er-er-er-er—Tell him I'll meet him in Albany."

Foxcroft Building
San Francisco.
Fred H. Meyer,
Architect
Exterior of
Cream
Matt Glazed
Terra Cotta

Pioneer Pottery Works of the Pacific Coast

ONE of the best known as well as one of the oldest pottery establishments on the Pacific Coast is the firm of N. Clark and Sons at present managed and controlled by Mr. A. V. Clark, president, and Mr. G. D. Clark, secretary and treasurer. The firm began business as far back as 1861, at which time the plant was located in Sacramento. In 1887 it was destroyed by fire and a more elaborate and extensive plant was erected in West Alameda. This plant covers about five acres and the main building is four stories in height. It is equipped with the latest machinery for the manufacture of clay products, its capacity being unexcelled by any in the State. A specialty is made of high quality architectural terra cotta in the various glazed and polychrome effects, also pressed brick of high quality in different colors. Vitrified pipe, hollow tile fire proofing, fire and roofing tile are also manufactured in large quantities. A few of the prominent buildings built of materials manufactured by this firm are illustrated on the accompanying pages. N. Clark and Sons have also supplied many notable buildings from Los Angeles as far north as Vancouver, and east to Salt Lake.

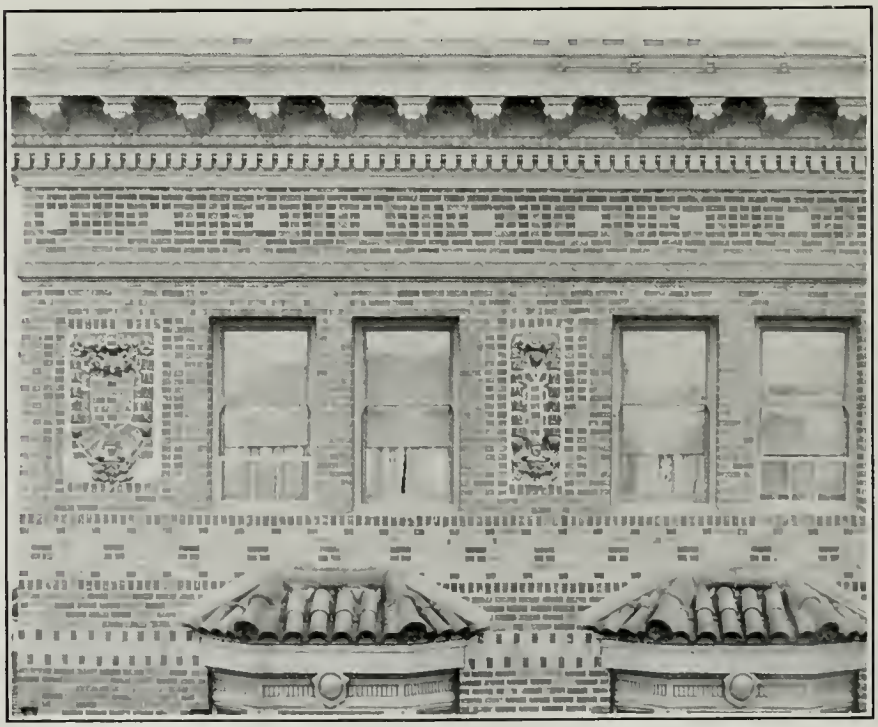
* * *

Life's Code

By the Late DANIEL H. BURNHAM

Make no little plans; they have no magic to stir men's blood, and probably themselves will not be realized. Make big plans; aim high in hope and work, remembering that a noble, logical diagram, once recorded, will never die, but long after we are gone will be a living thing, asserting itself with ever-growing insistency. Remember that our sons and grandsons are going to do things that will stagger us. Let your watchword be order and your beacon, beauty.

Citizens Bank of Winters, California. Walter H. Parker, Architect
Exterior of White Matt Glazed Architectural Terra Cotta Executed by N. Clark and Sons
Photo by Walter H. Scott



Detail of Top Story of Schmiddell Apartment House, San Francisco. Fred H. Meyer, Architect
Showing Rustic Pattern Brick Work and Terra Cotta Panels
as Executed by N. Clark and Sons

Walker Bros. Bank Building, Salt Lake City, Utah. Eames & Young, Architects
Terra Cotta Executed by N. Clark and Sons

St. Francis Realty Co. Building, San Francisco. William H. Weeks, Architect
Exterior Finished in White Matt Glazed Terra Cotta and Cream Pressed Brick by N. Clark and Sons

Heavy Tolls in Cities

It is shown that in cities where frame buildings are relatively scarce and where each is less costly than its solid neighbors, nevertheless so many more of them are destroyed by fire that their value is (with contents) $10,000,000 more in a year than the loss on solid buildings and their contents—truly an indictment of wood, a proof of the virtues of brick.

Mr. Franklin H. Wentworth, secretary and treasurer of the National Fire Protective Association, a body composed of some seventy-five such organizations as the Chicago board of underwriters (whose laboratories are the accepted authorities on fire resistants), the American Institute of Architects, the American Institute of Electrical Engineers, the National Board of Fire Underwriters, etc., writes as follows:

"We need to focus all the propaganda work that is possible to do to discourage the erection of wooden buildings. The conflagration hazard due to such construction is the most serious problem with which we have to contend."

That is first-hand information, is it not?

* * *

How Old Was Ann?

Teacher (to dull boy in mathematics)—"You should be ashamed of yourself. Why, at your age George Washington was a surveyor."

Pupil—"Yes, sure; and at your age he was President of the United States."

Front View of University Plan. Ernest Coxhead, Architect

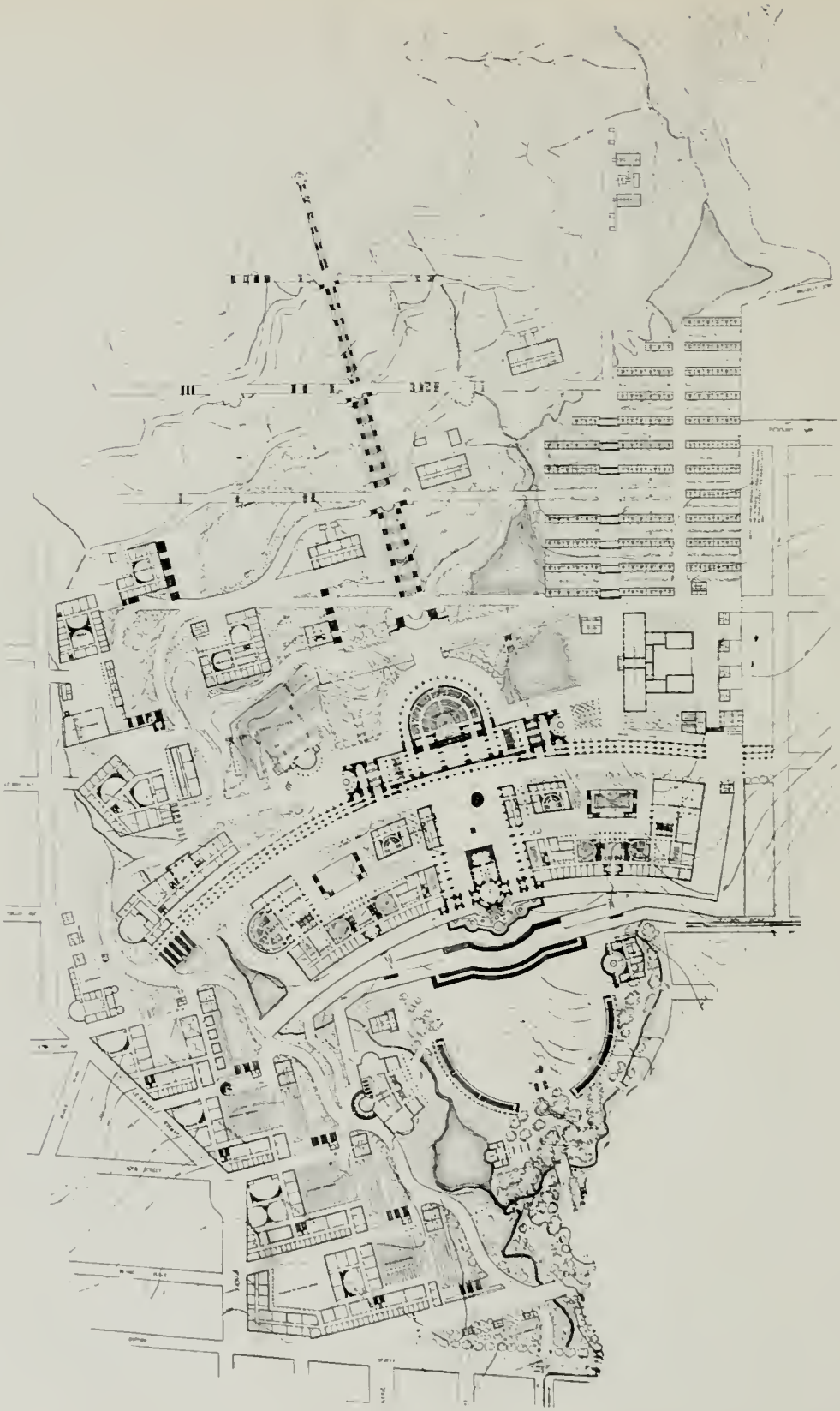
An Echo of the Phoebe Hearst Architectural Competition for the University of California

MR. B. J. S. Cahill's allusion to the University of California's architectural competition in his article on "The San Francisco City Hall Competition" in the July Architect and Engineer, has called forth a number of inquiries from readers of this magazine as to the requirements and conduct of the University competition. For their enlightment The Architect and Engineer has obtained a brief outline of the contest from Mr. Ernest Coxhead, who was one of the few San Francisco architects who submitted plans in the preliminary contest, and by courtesy of Mr. Coxhead his competitive sketches are shown herewith. The competitions were held in 1898, and there were over 100 designs offered from which number a cosmopolitan jury of architects, selected ten studies for the final judgment. The design of Mr. Coxhead was not among the ten selected for the final contest. Its further development was, therefore, uncalled for and the jury which met in San Francisco for the final award had no opportunity to study this plan and the conditions of the site together.

The programme called for the inclusion (if deemed desirable) of certain blocks north of the campus not owned by the University. The plan presented utilized these blocks, but was also so arranged that the main scheme would remain intact without their purchase.

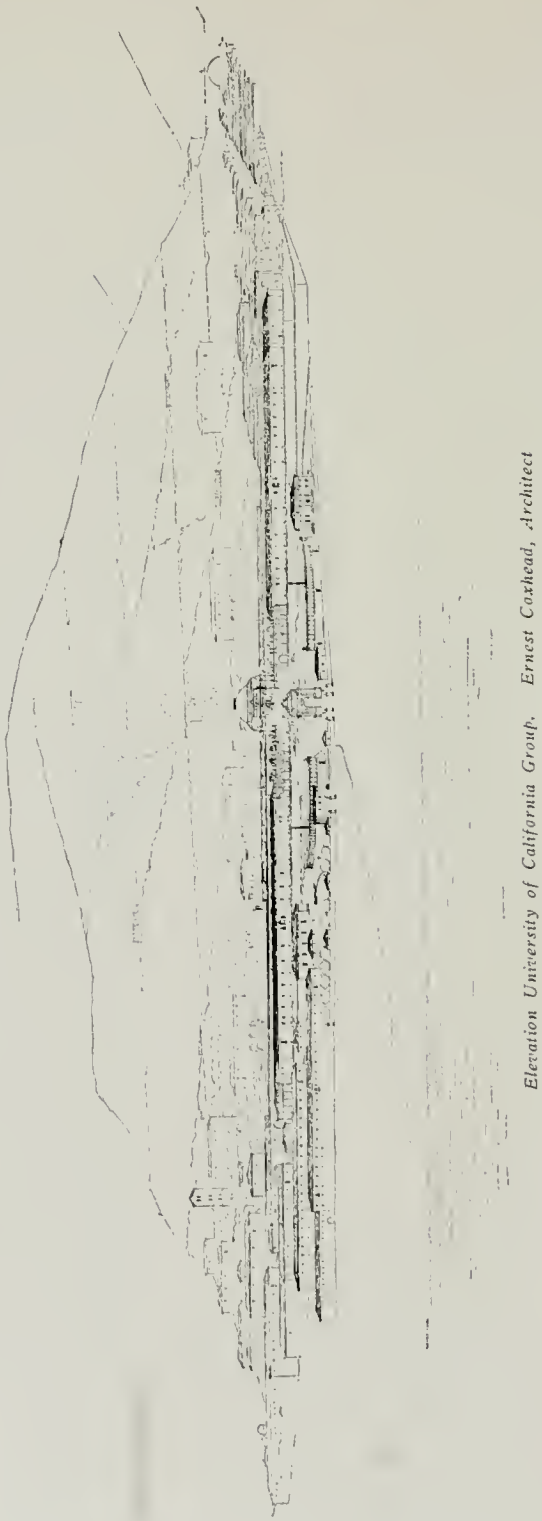
While the site of the University is beautiful beyond comparison it is rendered difficult of consistent treatment as a building site by the complexity of its contours and the abundance and beauty of its foliage, features which make for picturesqueness of setting, but add immensely to the questions to be solved in the architectural problem. Thus the great question raised for solution here was not so much where to place the central or main group of buildings as it was how to prepare the land, or to commence to prepare it for housing the great University of the future, and that development might be organic and systematic as well as with the least waste of energy. It was with this question in view that the problem was attacked.

Briefly described the plans present a series of terraces rising one above the other and conforming to three radiating axes meeting at a point at the extreme southwest corner of the property, the central axis being the main one. The meeting point of these axes is also the center from which



Ground Plan for University of California Scheme. Ernest Coxhead, Architect

Section Through Main Axis University of California Group. Ernest Coxhead, Architect



Elevation University of California Group. Ernest Coxhead, Architect

the arch of the main platform or terrace is turned. Incidentally, this central axis represents the longest straight line that can possibly be drawn in any direction through the property.

The fact that the land slopes more uniformly in a southwesterly direction than in a westerly direction, furnished the reason for not making the main axis parallel to the streets of Berkeley. By thus setting aside as of secondary importance the artificial influences and conditions which surround the property and making the existing natural conditions of the land within the boundaries of the property the basis upon which to build up a solution of the problem, a wider range for the terraces and level spaces parallel to and rising towards the hills was made possible. It was found as the plan developed that by curving the lower or main terrace the lines of it would conform even more closely to the contours of that particular part of the property.

It was recognized in the making of this plan that while no limit of cost was imposed on the competitors it was desirable for esthetic and practicable reasons to avoid radical departures from natural contours and existing grades. It was also patent that any great or comprehensive plan for the present and future University would suffer were a too close consideration for the lesser inequalities of the land allowed to unduly influence scope and character in the consideration of the whole plan.

Thus the great curve platform or terrace designed to accommodate the buildings, housing the classical courses and library, is obtained by the partial sacrifice of the ravine north of the new library building. This ravine is only incidental in the great natural hill system and divides two more or less level spaces which, if connected as indicated on the plan by bridging and partial filling, would develop an immense central level space for buildings and general circulation. The secondary axis passes through the center of this ravine, the secondary axis south passes through a similar land depression formed by strawberry creek over which the main terrace is carried in the plan by bridging again. In this way it was proposed to unite the three spurrs or hills formed by two incidental land depressions and by grading and filling, construct a great terrace for the main buildings which would be 600 feet wide from front to back, extending some 2,500 feet in length and giving level and direct communication from north and south Berkeley to the central court of honor, Library and all parts of the campus.

From this point on the development of the plan was a natural and simple process of repeating and expanding the terrace and platform system to the extent permitted or suggested by the contours of the property, always avoiding the sacrifice of any of the oaks or other foliage either for terraces or buildings.

In addition to the terrace system upon which the plan is constructed, it will be noticed that in the placing of the buildings on the terraces the gardens are systematically located on the easterly side and the buildings to the west of the terrace, thus giving protection to the gardens from the prevailing winds.

Some of the buildings shown on the plans though called for in the programme of the competition, are not now considered necessary, including dormitories, great auditorium and reception hall.

The plan places the principal special course buildings on the bare land at the northwest corner of the site and other buildings for special courses upon minor terraces north and east of the central group.

The San Francisco City Hall Competition

[From the Philadelphia Guide.]

ONE of the features associated with the recent San Francisco City Hall competition was the exclusion from participation of any but San Francisco architects. At the risk of displeasing some of its readers *The Guide* does not hesitate to express its hearty approval of this much-criticised feature. Architectural skill is not today confined to any one section of the country. In every city of any consequence men can be found equal to local requirements, whether architectural or structural. This being the case, there does not appear to be any good reason why these requirements should be met by the engagement of outside talent. Moreover, that which holds true of architectural competitions holds equally true in the matter of private commissions. *The Guide* has on more than one occasion felt the humiliation implied in the engagement of architects from other cities to design important buildings here in Philadelphia. The fact that the buildings thus brought into being happen to be exceptionally good samples of the most approved and modern architectural treatment does not in the faintest degree justify the gratuitous slight offered Philadelphia practitioners.

If it be urged that we have no Burnhams or Stanford Whites here in Philadelphia, it may be said in reply that we have a dozen men any one of whom could have supplied designs equally striking, artistic and utilitarian for the same sites and the same commercial demands.

* * *

San Francisco's new City Hall, while not perhaps a triumphant artistic tour de force, is in every sense a creditable and distinguished piece of highly intelligent designing. It will compare, in our own humble judgment, with anything of the kind attempted elsewhere with the additional advantage of standing forth to the world as San Franciscan throughout.

The San Francisco competition had some other features worthy of comment. For example, in this competition twenty of the competing architects are to receive a thousand dollars each. The winner is to receive nearly fifty thousand dollars, assuming that the winning firm supplies the preliminary plans only. In the event of the successful architects carrying the work through to completion, their recompense will be six per cent of the cost of the building. And this cost will be not less than four million dollars.

Why should a prize of that size be permitted to go to "outside" architects while it is at all possible to get skill of the right type near at home?

* * *

The Guide believes in "Home Rule" for Philadelphia as strongly as for San Francisco.

One of the Directors under the present administration of the city's affairs shows a tendency to go to other cities for what he is pleased to call "engineering skill." Have we no engineering skill here in Philadelphia, that it is necessary to dig men up from outside obscurity to come here and do things for us?

The Guide feels pretty strongly upon this subject and holds to the opinion that it is about time for Mayor Blankenburg as a loyal Philadelphian to step in and call a halt.

Philadelphia has done some pretty big things in an engineering sense within the past fifty years, finding it necessary upon but one occasion to call

in an outside engineer in the person of Major Cassius Gillette, of whom nothing more need be said than that he did not finish the filtration plant nor did he succeed in sending to prison any of the men so loudly charged with fraud in connection with it.

* * *

An article in the current number of The Architect and Engineer, of California, brings out in a clear and lucid way just how San Franciscans feel about this very succesful competition, citing incidentally certain defects in the program therefor that apply as pertinently to programs for competitions elsewhere as in the San Francisco now under discussion.

* * *

The Woman Architect

THE woman architect is a never-failing topic in the secular press—always pointing out how eminently fitted fair woman is to plan and design closets and kitchens as well as the further human-interest phase of the feminine touch exquisite and divine in laying out wall spaces for best decorative adornment, proper arrangement of doors, and numerous other similar points. The argument is that mere man as a designer gets the sinks too high, the pantry shelves inaccessible, the closet space inadequate as well as inconveniently located, and numerous other crimes and misdemeanors, gross and otherwise. Fair woman frequently can and would make a first-class designer of residences as well as other structures, but in singling out the things which are desired in the foregoing bill of complaint, it is to be observed that they are sought to be the main end and aim of the structure. That is something that no owner would endure, if put to him baldly and flat. And it is in the working out of the combination of the general arrangement that some of these things do not get the attention which sometimes seems desirable. The average architect desires to please his client quite as much as anyone else. He wants to give the relative closet space and domestic equipment arrangement which seems to be essential. But when the arrangement is made on that basis, it calls for material extensions of the general plan in order to handle them as they are desired, and here is where the average client balks. He may want everything that the critics claim is needed, but very often he does not want it at the expense of cutting into other portions of the structure, and still less does he want to make the general extension of the building, in order to handle all the needs. It often works out to the old problem of the immovable body and the irresistible force. Given a maximum cost, and a maximum size of structure, accompanying certain indispensable rooms and equipment, and there comes a point where something must give way. And even fair woman, as accomplished as she may be, cannot defy the laws of physics and mathematics, and produce more closets and better arrangement in every way, without impinging upon some of the inhibitions so often encountered. There is no sex to genius, and woman can plain dwellings, if such be her trend and bent, but on the other hand, she may not be able to meet every side of the demand from the average impractical owner any better than her male competitor. If it be that she does produce a better kitchen and closet arrangement, it may be at the expense of other factors which in their absence seem to be even more important to the aggrieved owner. The architect—male or female—will try to produce what the owner wants. But too often that is a flexible and variable quantity which cannot be met without a structure which has the advantages of the condensed flat, and at the same time has the space of bungalow, the expanse of the country home and can present alternately every style of architectural arrangement, known and unknown.

Art Control of the Panama Canal

(Extracts from the remarks of Senator F. G. Newlands in the U. S. Senate, August 9, 1912).

AS this canal is now approaching completion, I have a suggestion to make to the committee in charge, and I shall be glad to supplement that suggestion hereafter by an amendment; and that is, that in finishing that great structure we should take into our councils the great men in architecture and in art who have done so much in the way of the artistic development of the country since the Chicago World's Exposition. In ancient times no great structure of this kind was completed without utilizing great men in architecture, sculpture, and painting, and their work has gone down to posterity with the work of the great constructors.

We have been utilizing in the construction of this canal a very plastic material—concrete—which can be molded into any form without additional expense and which can be made attractive in appearance as well as useful in purpose.

There has been a strong movement in this country, almost ignored by Congress, but a movement which has a strong hold upon the American people, in favor of democratizing art. We have seen organized all over the country associations of architects, artists, sculptors, engineers, associations organized in the various States devoted to the arts, including music, national organizations of each one of these associations, and a federation of arts which is bringing them all into co-operative action. They have developed a journalism of their own, devoted to the arts, music, painting, sculpture, and architecture, and they are doing much to impress the public opinion of the country.

America, blessed by nature, with all that is beautiful and attractive to the eye, has defied ugliness in the works and structures of man, and it is only of late years that we have had a renaissance of art, a renaissance of that culture that existed in the time of Washington and Jefferson and which is exemplified in the public structures which they erected.

It seems to me this is an appropriate time to bring the commission of arts, recently organized by national legislation, into co-operation in an advisory way with the Panama Canal Commission, and that they should be called upon to make some suggestions which will enable us to crown this structure with an artistic demonstration so that it will be representative to the nations of the world and to future generations, not only of the constructive genius, but the culture of our time.

I am aware that many think that the arts hardly constitute a part of civilization; that has been the materialistic view which has prevailed; and I have seen smiles upon the faces of some of my friends in the Senate Chamber as I broached this subject. The arts not a part of civilization! Civilization consists mainly of literature and the arts, and art finds its highest work in uniting the beautiful with the useful in such a way as to make art the common heritage of all the people and not confine it to a privileged class.

We find art in Europe democratized everywhere, and it is because of this that the artisans of Europe far surpass American artisans, not in capacity, but in the nice training and culture which produce the highly finished articles that command the highest prices throughout the world. The commonest peasant in France or Germany has access to the accumulations of the ages in art, the accumulated experience in design.

This feeling which has been increasing throughout the country has resulted in the creation of the National Commission of Arts, composed of the great architects of the country, the great artists, the great sculptors, the great

constructors, men who have done more in the way of advancement on these lines in the last 20 years than had been accomplished within the entire history of the Republic; men who, receiving the training of the very best schools abroad, have, with a practical American genius, applied the information which they have received there to the material things of life. These men are not merely great artists, they are great constructors, great administrators.

There are men upon that art commission who are consulted by the great railway men of the country with reference to methods of traffic, particularly the traffic of cities, the great terminal stations that now adorn our country, and enterprises of that kind. In great private enterprises the artist, the engineer, and the constructor are yoked together for effective work. Go into the offices of our leading architects and you will find two or three hundred employees—artists, designers, draftsmen, engineers—all working with perfect system, and so you realize that the men—the so-called artists—on this Commission of Arts are men of great constructive and administrative capacity.

Now, I should like to see something of that kind provided for in this bill. I should like to see that Commission of Arts, which has been appointed and organized for the purpose of giving the President and Congress advice upon these matters, commissioned to visit the Isthmus of Panama and to suggest to the Congress of the United States how that great constructive work can be appropriately crowned by some artistic design that will be a fitting memorial of the spirit and culture of our time.

I hope that the Senate—taking, as I know it always has done, a broad and liberal view of the importance of the art development of the country; of the necessity of seeing to it that our public buildings, structures, and works are of the highest artistic quality—will at all events commission the National Commission of Arts to inquire into this matter and to make a report as to whether the existing work, plastic in character, can be molded into such form as will be attractive to the eye, and also as to what appropriate memorial shall be raised that will exemplify to the nations and to the ages the high development of artistic culture in the United States.

* * * * * * * * * * * * *

MR. NEWLANDS. I offer an amendment to section 4, which has the approval of the chairman of the committee.

The PRESIDENT pro tempore. The Secretary will state the amendment.

The SECRETARY. At the end of section 4 it is proposed to insert the following words:

> The President, before the completion of the canal, shall cause the Commission of Arts to make report of their recommendation regarding the artistic character of the structures of the canal, such report to be transmitted to Congress.

The amendment was agreed to.

* * *

A Boomerang

Mark Twain wished to borrow a certain book from a neighbor in Redding, Conn.

"Why, yes, Mr. Clemens," said the neighbor, "you're more than welcome to it. But I must ask you to read it here. You know I make it a rule never to let a book go out of my library."

Some days later the neighbor wished to borrow Mark Twain's lawn mower.

"Why, certainly," the humorist genially acceded. "You're more than welcome to it. But I must ask you to use it here. You know I make it a rule never to allow my lawn mower to go off my lawn."

Design for Panama-Pacific Exposition Monumental Tower

Service Building, Panama-Pacific Exposition. This Structure will house the Police and Fire Departments

Panama-Pacific Exposition Structures Authorized

THE plans for two structures for the Panama-Pacific Exposition have been approved and working drawings authorized by the directors. In fact, a contract has been let for one of the structures—the service building, which will house the police and fire departments. The building will be of frame construction with cement plaster exterior, and will cost $60,000. It will be 150 feet square.

The other structure that has been authorized is the Exposition Memorial Tower, designed by H. L. Pelton and P. E. Fergusson. The tower will be permanent and will eventually revert to the City of San Francisco. It is to be 850 feet in height above the ground level, and, with the single exception of the Eiffel tower in Paris, will be the tallest structure in the world.

Private capital is to be utilized in building the tower, which will cost not less than $1,500,000 and will be one of the main architectural features of the exposition. In all probability it will be erected at the summit of Lincoln park, although the site has not been chosen. It will be of steel frame construction with outer walls of marble or terra cotta. Some of the most eminent engineers of the country have passed upon the practicability of the plans and furnished estimates of cost.

The base of the tower will be 232 feet square and 120 feet high, containing a great memorial hall. From this base will arise the main shaft, 730 feet high and 85 feet square, giving a total height of 850 feet. Four express passenger elevators will be inclosed in this main shaft. If erected at the summit of Lincoln park, the top of the tower will be approximately 1,300 feet above sea level, or 316 feet higher than the Eiffel tower and 745 feet higher than the Washington monument. Even if erected at sea level, the tower will overtop any structure in the world except the Eiffel tower.

It is intended to utilize the tower for a meteorological observatory and wireless station and to install a powerful light, which, under favorable weather conditions, will be visible 100 miles out at sea. The base of the tower will be surmounted by four groups of statuary and will be surrounded by a frieze depicting the development of the North American continent.

Satisfactory Settlement of Iron Workers' Trouble

By Wm. E. HAGUE.

THE Housesmiths and Architectural Iron Workers' Union, San Francisco No. 78, recently made a demand upon their employers for an 8-hour day, to take effect August 26th, 1912. The employers in this particular branch of the building business are associated together in the Master Housesmiths' Association, and, with very few exceptions, all the structural steel and ornamental iron contractors are members of that association; and the association is also a member of the Building Trades Employers' Association, which is the central body of builders in San Francisco.

After careful investigation of the business conditions existing among the employers in the Master Housesmiths' Association, the demand was found to be impractical, and one which could not be granted if the contractors were to continue in business and successfully compete with other cities in more favored localities.

This particular demand is another phase of the old metal trades' controversy, embodying the fight for the 8-hour day in all the metal trades' industries of San Francisco.

After numerous efforts to convince the union that their demand could not be granted, owing to the fact that competitors all over the country were working nine and ten hours a day, the Master Housesmiths' Association referred the controversy to the Building Trades Employers' Association for adjustment and submitted to that body the following statement:

"On the 24th day of May, 1912, the members of the Master Housesmiths' Association, doing business in this city and county, received notices in writing from the Building Trades' Council of San Francisco, to the effect that the members of the Housesmiths and Architectural Iron Workers' Union, Local No. 78, who are employed in shops would work only eight hours per day on and after Monday, August 26th, 1912.

"The members of the Master Housesmiths' Association, which organization belongs to your body, met, considered the communication and appointed the undersigned committee to report their views in full to your association.

"In San Francisco the eight-hour day is the rule for employees engaged in the various building trades, and the most important exception to this rule exists in the shops of the structural steel and ornamental iron trades, where the nine-hour day prevails. Before taking any definite action it will be necessary to determine whether there is a just reason for this exception. Of all the trades engaged in building operations in this city and its vicinity where the eight-hour day prevails, none comes into competition, either directly or indirectly, with eastern concerns, while our members are constantly struggling for existence with the largest and most powerful organization engaged in similar lines in the eastern states. We must, therefore, consider the conditions prevailing at competing points before we can intelligently pass upon the matter at hand.

"The western states are at a disadvantage in matters of transportation, as there is no differential in freight in favor of raw material. The finished product can be transported at the same rates as the raw material. The proximity of eastern states to the mills where the raw material is produced enables them to effect a saving in transportation and to utilize their waste material. In all manufacturing establishments there is a large amount of waste, and unless the same can be worked over, becomes practically a total loss. By reason of the great distance intervening between us and mills utilizing such material, our waste cannot be transported, and becomes practically a total loss. Our eastern competitors utilize their waste and derive large revenues therefrom.

"These disadvantages are not of themselves fatal to our industry, but the item of greatest importance is the question of wages. We have obtained statistics showing the minimum and maximum wages paid in the largest plants in the eastern states with which we come in direct and fierce competition. A comparative statement will speak for itself:

	Eastern Shops		S. F. Shops	
	Min.	Max.	Min.	Max.
Layer Out	30	35	44 1-3	60
Punchers	20	27 1-2	33 1-3	42
Assemblers	30	34	44 1-3	55
Assemblers' Helpers	15	17	33 1-3	
Riveters	20	27 1-2	33 1-3	40
Painters	16 2-3	18 1-3	27 1-2	
Template Makers	30	33 1-3	44 1-3	60
Reamers	16 2-3	-	33 1-3	

	Eastern Shops Min.	San Francisco Shops Min.	Max.
Shop Helpers 17 1-2		27 2-3	33 1-3
Laborers 17 1-2		27 2-3	

"The average minimum wage for one employee in each class above enumerated under the scale of wages prevailing in the eastern states is 21½ cents per hour, while the average of the minimum wage in this city computed on the same basis is 35 1-3 cents per hour. Under present conditions the average minimum wage in San Francisco is about 66 per cent over that paid in competing eastern shops. If we should inaugurate the eight-hour day in the place of the present nine-hour schedule our wages would be increased 11 1-9 per cent. The wages then paid to our employees would be about 77 per cent higher than those paid in the eastern states. By reducing the number of hours as demanded by our employees the output of our plants would be diminished proportionately, but our overhead expenses would remain at the same figures; and thereby the additional burden placed upon us by the eight-hour day by reason of such overhead expenses would be an amount equal to not less than 4 per cent of the wages paid in the eastern plants. The total increase in wages resulting from the shorter schedule would be at least 15 per cent, and the difference in the wages prevailing here and in the eastern shops would then be about 81 per cent.

"The plain statement of facts above set forth should be sufficient to convince you of the great handicap under which we are working, but it is important to go a step further and consider certain shop rules in force in various plants. In the east there is no restriction as to the number of apprentices that can be employed, and we frequently find many apprentices performing work that is done by mechanics in our shops. We are restricted to one apprentice to four mechanics; consequently a greater portion of our work is turned out by higher paid men. In the east many products are made on the piece-work plan, while that is prohibited to us. The eastern plan results in a tremendous saving in the cost of the finished product. In the shops of our eastern competitors the men work from nine to ten hours, while our men work only nine hours per day.

"The statement hereby presented is a plain statement of the conditions existing, and no effort has been made to exaggerate or to embellish this communication for the purpose of misleading you. We have come to the conclusion that we can not accept or accede to the demand of our employees for an eight-hour day, and our conclusion is based upon the facts hereinabove set forth, which may be classified briefly as follows:

"1. The great distance of our shops from the source of production of raw material and the freight rates, which are the same for raw material and the finished product.
"2. The almost total loss of waste in our shops as against the utilization of the same by our competitors to their financial advantage.
"3. Difference in wages, which, under the present conditions, are about 66 per cent higher in our establishments than in the eastern shops.
"4. The wages under the eight-hour day would result in our wages being at least 81 per cent higher than in the shops of our competitors.
"5. Difference in shop rules, which in the eastern states place no restrictions on the number of apprentices, and which permit the piece-work plan.
"6. In the shops of our competitors the men work from nine to ten hours, while the maximum day in our city is nine hours.

"On all important contracts entered into in our city, representatives of eastern concerns are active bidders, and by reason of the great advantages and handicaps given them by the conditions hereinabove set forth, our competitors have taken from this city contracts, which, during the past twelve months, have amounted to a grand total of not less than six hundred thousand dollars. Had this work remained with us there would have been saved to San Francisco a sum aggregating two hundred thousand dollars. If we should grant the demand for an eight-hour day we would be placed under still greater disadvantages, and it would be impossible for us to obtain our just proportion of the contracts entered into in this city. Not only would our establishments and the proprietors thereof suffer, but our employees would find less work, and our city would suffer by reason of eastern competition.

"We respectfully submit that in view of the foregoing it will be impossible for us to change our shop rules, and that we must respectfully decline to give any further concessions which would increase our operating expenses.

"Realizing that the Building Trades Employers' Association can be of great assistance to us in the contest for what we consider our rights, we ask your co-operation and best endeavors to prevent, if possible, a strike.

"Respectfully submitted,

"(Signed) H. J. RALSTON,
"(Signed) H. MORTENSON,
"(Signed) OTTO SCHRADER,
"Committee of Master Housesmiths' Association."

The facts contained in the foregoing statement were investigated by a committee composed of delegates from other associations affiliated with the Building Trades Employers' Association and were found to be substantially correct. The Building Trades Employers' Association then submitted a resolution to each affiliated association, the same upholding the stand of the Master Housesmiths, and requested that each association take individual action on the resolution and instruct its delegates how to vote before the central body. For the first time in many years the organized employers seemed to be absolutely of one mind, and every association affiliated with the central body voted unequivocally to support the Master Housesmiths' Association in resisting the demand of the union. There was no animus in any of the associations in taking this action, and the merits of the controversy were considered from a purely business standpoint; and it would seem from this that the contractors of this city, generally, have come to the conclusion that no further unreasonable demands can be granted to the unions in this city, and that conditions for the mechanics are already as favorable as can be hoped for; and any one familiar with the union conditions in this city and open to take an unbiased view of the situation, will no doubt agree that the contractors are right in this.

For years past in San Francisco the unions have continually been making demands upon their employers and adopting arbitrary rules, and owing to the fact that there has been no regular organized opposition, they have won out in almost every case with very little trouble, the contractors being forced to grant the demand owing to a lack of proper organization. It is stated by some contractors that they have been able to let a contract for the steel work to a Los Angeles firm at a less price than they could obtain from any firm right here in San Francisco; and if this is the case it is certainly time that some action was taken to protect our home industries.

The contractors of San Francisco as a whole do not seem to want the "open shop" and wish to treat fairly with their men, but if San Francisco is to continue to successfully compete with other cities on the Pacific Coast it is quite certain that no further demands which will increase the burden already placed on the industry can be granted.

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* *

The "American Style" in Architecture

Writers in the architectural and non-technical press who bewail our supposed lack of an "American style" may find the following clipped from the New York *Press* of interest:

"There is an American architecture," said the traveler, "but not many Americans will believe it until they have taken a course in moving picture shows in foreign countries. That was what convinced me. Owing to ignorance of foreign languages we sought most of our dramatic entertainment in Europe from the cinematograph. No matter where we went one-half the pictures were American. Sometimes they were so labeled, sometimes not, but whether they were or not we soon learned to tell American pictures by the architecture. Skyscrapers, of course, were the chief distinguishing mark, but high-stooped stone houses and frame cottages with two or three wooden steps leading up to a porch were just as unmistakably American. All the way from Inverness to Cairo the minute we set eyes on one of those houses we knew we were looking at something that couldn't be duplicated outside the United States, and all the rest of the audience knew it, too."

Among the Architects

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The Dream and the Awakening

Willis Polk made an eloquent speech at the dinner given by the World's Fair directors to the distinguished members of the architectural commission. It was a propitious occasion for eloquence. The architects, the artists and the sculptors had finished a three-day session which left them on the edge of brainfag, but their work had shown brilliant results and their minds were attuned to the note of praise. There was deep silence in the red room of the Bohemian Club as Willis spoke, silence occasionally interrupted by applause. Willis was at his happiest. He told how the architect detached himself from the sordid cares of the workaday world and plunged headlong into revery; how he sent his mind careering over the fields of imagination, plucking the flowers of fancy and weaving them into a garland of beauty; how he shut out the stress and turmoil of mere existence and fed his craving soul on the manna of the ideal; and how, while the layman asked that the dirt might fly and that walls should rise to show that the work was proceeding, the architect, wiser, closer in touch with the creative force and conscious that actual construction was the easiest of his labors, kept on dreaming, dreaming, dreaming. A splendid speech, and worthy the applause which rounded out its glowing peroration. Then arose President Charles C. Moore who simply said: "You architects are entirely welcome to dream away your sleeping hours, but I want to tell you that the alarm clock is set and when the alarm goes off you've got to get up and go to work."—Town Talk.

James Knox Taylor's New Office

It has been stated in the daily papers that Mr. James Knox Taylor, for many years supervising architect of the Treasury Department at Washington, has been invited to become a professor in the department of architecture at the Massachusetts Institute of Technology. A man of Mr. Taylor's rare accomplishments would be an important addition to this dignified school whose faculty already numbers some of the most distinguished educators in the field of architecture.

D. H. Burnham's Splendid Bequest

A fund of $50,000 for the establishment of a library of architecture at the Art Institute, Chicago, was the sole public bequest contained in the will of the late D. H. Burnham, disposing of an estate estimated at $1,300,000. This fund will be used by the Art Institute in purchasing books on architecture at its discretion.

Engineers' Employment Bureau

Orrin E. Stanley, with offices in the Chamber of Commerce building, Portland, has been authorized by the executive board of the Oregon Society of Engineers to prepare a circular letter to be sent to each of its members asking for their history and the line of work they desire to follow, whether architectural or engineering in its different branches. As soon as this letter has been forwarded and replies obtained Mr. Stanley, who has charge of the employment bureau, will endeavor to obtain positions for those wishing to change and those out of employment, and will be in a position to advise the public whether he has a man on his waiting list who can fill the position satisfactorily. The employment bureau will not be run merely to get an engineer a position but to get him, if possible, the kind of work which he prefers and at the same time be in a position to help out the employer. The society is to be congratulated on this move, as at the present time there are, undoubtedly, some engineers out of employment and others who wish to make a change. It is understood the bureau will not confine its work to Portland and vicinity, but will cover outside territory as well, securing work for its members wherever possible.

British Columbia Architects

Members of the British Columbia Architectural Association in Vancouver, B. C., are contemplating an art review to be held this fall. Arrangements are under way for securing an exhibition hall in which will be exhibited a number of sketches, elevations and miscellaneous drawings from the several architectural offices of that city. Certain lines of materials may also be accepted for display. The exhibition will be open for a period of two weeks.

Spokane Architects

The Spokane Architectural Club held its second annual outing at Hayden Lake, Idaho, on August 8th. A special train took the architects and their ladies over the Inland Electric road, leaving the terminal station at 10:30 a. m., and a breakfast lunch was served at the lake at noon. The afternoon was given over to a program of athletic events, and after dinner at Bozanta tavern there was dancing. The committee in charge included: F. P. Rooney, E. V. Price, H. G. Ellis, G. F. Schofield, W. H. Moore and H. R. Chapin.

Outing by Seattle Architects

The members of Washington State Chapter of the American Institute of Architects, forsook their offices Saturday, July 27th, and forgetting business worries journeyed to Victoria for a

day's outing. Architects who participated in the excursion were: A. S. Albertson, James Stephens, David J. Myers, W. R. B. Willcox, J. F. Everett, J. H. Schack, Charles H. Alden, C. E. Gould, Max Umbrecht and J. S. Cote. Architects Heath & Gove, of Tacoma, also were in the party.

The Course in Architecture at George Washington University

Under the incentive of the Washington, D. C., Chapter of the American Institute of Architects, the George Washington University will, it is stated in local papers, reopen this fall the course in architecture.

A contingent fund of $1,000 has been secured and a special committee of the Chapter appointed. The Chapter has appropriated $200 towards the fund, and the balance has been pledged by Chapter members.

The directors of the Corcoran Gallery have, it is stated, joined in the movement and will give free instructions in drawing to the architectural students.

This is a further example of the paternal solicitude of the man in practice towards his younger professional brother. The concern that is everywhere displayed in the cause of architectural education is the chief reason for the rapid progress of the art in America.

The Forthcoming International Exhibition at Ghent, Belgium

Among the features that are expected to be of special interest at the international exhibition to be held in Ghent, Belgium, next year, is the photographic section of the exhibition of fine art and the archeological congress to be held as a part of the exhibition.

The committee in charge of arrangements for the accommodation of visitors at the exhibition, it is announced, has classified all lodgings in Ghent according to price, so that visitors may obtain exactly the sort of lodgings they want with a definite knowledge of what such accommodations will cost per day. The city of Ghent is building a new seven-million franc hotel near the exhibition grounds, which will be completed early next year.

The Engineers' Club of San Francisco

Another effort is being made to establish an engineers' club in San Francisco with the ultimate aim of performing the same functions as the New York club. The officers for the first year have been selected as follows: C. W. Merrill, president; A. H. Babcock, M. H. Peck, vice-presidents; A. M. Hunt, treasurer, and H. Foster Bain, secretary.

A Pointer for the Brick Interests

(From Concrete-Cement Age.)

The opening of the Panama Canal marks an epoch in world development, and the exposition to be held at San Francisco in 1915 to commemorate this event should be a great achievement. Within six years, San Francisco has risen from ashes, and her civic pride and effort have been aroused and united. The achievement to be celebrated is of world interest, and the outlook indicates a great and successful gathering.

Our immediate interest in this is to take advantage of this gathering to hold a cement show which will bring home most effectively the wonderful development and the universal utility and economy of this material. Concrete is used throughout the canal structure, and building the canal has developed new methods of handling concrete, new forms, etc. The canal construction from the first has been a wonderful concrete exposition, a "Cement Show" on a stupendous scale. It seems especially fitting that at the world exposition to celebrate the canal's completion a cement show should be held, and we hope that steps will be taken toward that end.

May Hold Competition for Hospital Group

The supervisors of Alameda county, will probably hold a competition for design for the new county hospital buildings. The board has taken preliminary steps towards getting an architect by passing a resolution requesting the Alameda County Tax Association to submit to the board the name of an architect qualified by training to "formulate a programme for obtaining competitive plans and specifications for a new county infirmary and hospital and to be one member of a commission of experts to examine said competitive plans and specifications and to recommend which plans in their judgment should be adopted by this board."

Architects Granted State Certificates

The State Board of Architecture has granted certificates to practice architecture to the following:

William H. Kraemer, 380 Pacific Electric building, Los Angeles; Arthur J. Williams, San Diego Hotel; John B. Lyman, Jr., 721 Timken building; Edward T. Banning, general delivery; Leonard T. Bristow, 721 Timken building; David H. Holmes, 616 Timken building; all of San Diego.

February Number Wanted

Architect William Mooser, Nevada Bank building, San Francisco, will pay 25c for a copy of the February, 1912, Architect and Engineer.

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A WORD OF PRAISE FOR ARCHITECT FITZPATRICK

Twenty-five years ago architects and engineers called him a "troublesome crank," ten years ago they said he was a "visionary enthusiast," and today they are falling over one another in their haste to do as he has been preaching and to assure the "plain people"—who are beginning to know something about the matter themselves and to inquire—that that's the way they always intended to build, that they always knew all about it, and indeed, that Fitzpatrick is making an unnecessary lot of noise, for all of the big buildings, anyway, *are* fireproof.

He has been a sort of John the Baptist, sometimes preaching in the desert, but mostly haranguing the cities and the builders, and he has made them listen. The better construction of our cities has been his hobby, his ambition. A city is but an aggregation of buildings, and as is the character of those buildings so is the city good or bad.

Mr. Fitzpatrick has most aptly put it that fireproof construction is, like a chain, only as strong as its weakest link, and, generally speaking, architects and engineers seem satisfied to have but one strong link in the building, its structural skeleton.

He has patiently, but persistently, agitated the matter in the press, preached to the cities, heckled the architects, organized civic societies, gotten the Building Departments together, and made so much stir about it that at first a few others followed him, and now literally hordes are marching in his footsteps. There are National Fire Prevention Societies, nearly every State has some such organization; the insurance people preach fire prevention; there are journals devoted to the cause, and the agitation is so widespread that there is hardly a city in the Union that has not just revised its building code, or is doing it now. And it has been recognized that certain restrictions that Mr. Fitzpatrick advised years ago, and that not more than five years ago were looked upon as intolerable hardships, are and always have been veritable

boons and the very greatest economies to the municipality and to the individual. And it is time that good, safe construction be compulsory, for our fires have been growing at a far more rapid ratio than has our population or our wealth.

Mr. Fitzpatrick's early training was as a military engineer, but he soon branched off into architecture. He is as well known in Europe and in Canada as he is in this country as one of the great authorities on construction. Many contend that the inception, the invention, of the steel frame, the "sky-scraper" construction, was his.

At the same time he ranks as one of the best and most artistic designers in the land—a rare combination. His early success was in the Middle West and in Canada, but for the past fifteen years he has lived at the National Capital, at first designing important and notable buildings for the Federal Government and for the States, and latterly confining his practice exclusively to consultation work.

He is a prodigious worker, for, in spite of his professional work and his fire-prevention campaign and all the labor it entails, the travel, the writing of city codes, text books, and what not, he still finds time to devote to other almost as useful hobbies. The "City Beautiful" movement, and "Postal Savings," for instance. At the latter he worked for years as a "side issue," and it was owing in no small part to his persistent endeavors that it finally became a law. His splendid physique enables him to do two men's work. Though nearly fifty, he is one of Washington's most earnest and active athletes, a great walker, rides much, plays a fine game of tennis, sleeps out of doors the year round, and pleads guilty of being a good deal of a "crank" in general. His friends qualify that by insisting that he's one of the most useful and interesting cranks in the land.

PULL DOWN THE SHACKS!

Mayor Rolph has been getting after the owners of temporary buildings who seem loth to replace them with fireproof structures. He has also stirred things up with all the City Departments—told them, in fact, that, though they might be able to play golf, they couldn't "play Rolph." The "Rolph Stick" seems to be getting as famous and effective as the "Teddy Club." We regret to see that President C. C. Moore, of the Panama-Pacific Exposition, who has been preaching the "City Beautiful," does not lend practical aid to the mayor's policy and do away with that one story shack at First and Mission streets, in which the C. C. Moore & Company are still doing business. It is certainly an eye sore to the down town district.

BRICK A VALUABLE MATERIAL

For many, many years brick has been a great factor in the building industry and it is safe to say will be for numerous years to come. It is a most useful material, has excellent lasting features and its use makes a building durable for generations to come. There are a vast number of men engaged in both the manufacturing and the laying of brick in every portion of the world. Like lumber, it is a universal building material. A brick building, whether it be a residence or business house, always presents an attractive appearance. It also has the most desirable feature of being durable. It is also a splendid material in the matter of sidewalk construction, and as for chimneys it plays a prominent part. Take brick all in all, it is a useful material to employ in the world of construction, there always being a place for it.

The excellent brick companies whose advertisements appear in this publication furnish lines that are equal to those made anywhere and superior in several cases to those of other sections. The best of workmen are employed and the best of machinery installed, and when you honor these gentlemen with an order you can rest assured the same will be filled promptly and the best of goods furnished you.

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Purity and Permanence in Metals

IT is a fact long established in the scientific world that pure metals resist the action of acids to a much greater extent than those which contain foreign substances. The action of solvents seems to be decidedly hastened by the presence of particles of impurity, which, even when not of such a nature as directly to promote dissolution, undoutedly exert an indirect influence by lessening homogeneity and consequent cohesion.

Only recently, however, has the engineering world awakened to the practical significance of this fact. The preservation from corrosion of metals used for various structural purposes is a very serious problem,—one which is absorbing the attention of some of the best minds of our time; but the idea that the same quality in a metal which tended to retard its destruction in the laboratory is also effective against the reactions occurring under service conditions as a result of the presence in diluted form of similar chemical agents in the air, water and soil, has only become clearly defined within the last few years. Practically pure zinc is found to be a far more effective coating for iron or steel than a galvanizing containing iron, lead and cadmium in percentages but slightly exceeding those still remaining in the highest grade product. Copper wire is graded, not only in respect to conductivity, but also of durability in accordance with its purity. The president of a large railroad company recently stated that an expenditure of many thousand dollars which his company had made for copper for exposed installations had been largely wasted through failure to secure a pure metal.

It is undoubtedly true that certain alloys of iron resist the direct action of sulphuric acid, under laboratory conditions as well as and possibly better than the pure metal, the most notable example being that of copper-steel, or a steel containing one-tenth to one-fourth of one per cent of copper. The action of the copper in this case, however, in protecting the steel from acid corrosion is, for various reasons, possible only under test-tube conditions, and not in actual service, where the copper-steel seems to rust more rapidly than pure iron. It is chiefly this fact which has led to the discrediting of the once popular sulphuric acid test as a means of determining the relative durability of metals.

The discovery of the relation of purity to permanence in metals is of the greatest importance in respect to iron and steel. Iron moves the world in our day; the value of iron and steel products exceeds by hundreds of times that of all other metals; and the bringing to light of the fact that iron resists corrosion in proportion to its freedom from foreign substances will no doubt take rank with the triumphs of science and invention.

The amount of impurity contained in ordinary steel is so seemingly slight that, to the untechnical mind, even its practical elimination apears an inadequate reason for a great difference in resistance to corrosion; but we have to remember that in the field of chemistry, as in many other, great effects sometimes ensue from small causes. A very little kerosene will impart a distinct flavor to a considerable quantity of water.

The possibility of an actual dearth in the ordinary metals seems very far distant; yet when the enormous annual consumption of iron is considered, together with the fact that our apparently huge supplies of ore are in reality absolutely limited, it is conceivable that a time may come when this homely material will be more precious than gold. On the other hand, it may become possible to so preserve metals from the action of the elements and from the wear and tear of our present, comparatively crude methods of industry as to indefinitely postpone a reversion to the Age of Stone.

Plans for Seven Piers

The California State Harbor Commissioners announce that its engineering department is preparing plans and specifications for the constrution of seven piers to be located in the vicinity of Mason, Powell and Stockton streets, and also for six new ferry slips.

Laying Vitrified Pipe

Commence at the lower end or outlet of the proposed sewer and grade trench with a uniform inclination throughout its entire length.

After bringing bottom of trench to true uniform grade, excavate a suitable depression for each hub so that the body of the pipe when laid will have a full firm bearing on the ground.

Commence laying the pipe at the outlet with all hubs facing up grade.

It is most important that pipe be laid on a solid bearing through its length and that the sides be carefully rammed to distribute pressure evenly over entire surface of pipe.

In laying sizes from 8 inches up, it is safer to dig a narrow trench, say 6 to 8 inches wide and 3 to 6 inches deep, according to size, in middle of trench, with depression for sockets, as advised above. The pipe being laid in this manner will be sure of firm bearing along the sides, and if the loose earth is well tamped and rammed from this bearing up to a point above center line of pipes, they will stand a very great amount of pressure.

Where larger sizes are being used and the trenches are deep, or in railroad embankments where the filling is put on after the pipe is laid would advise using double strength pipe, and in selecting the size of pipe to be used liberal allowance should be made for abnormal rainfall and other extraordinary conditions.

Vitrified salt-glazed pipe is everlasting in itself, and the best of material and workmanship should be used in connection with it. At the outlet or spill of culverts an apron should be formed of brick, stone or concrete and carried out to a sufficient distance from the face of the bank so that there will be no danger of the earth being washed away.

When the soil is of such character that the pipe cannot be properly supported by tamping, or other extraordinary conditions render great precautions advisable, a concrete bed or foundation extending up the sides of the pipe to its horizontal center and about six inches thick will add greatly to the stability and durability of the work.

When capacity greater than afforded by one pipe is desired, two or more lines of pipe may be laid side by side, hut care must be taken that the separate lines are laid far enough apart to secure a solid bed for each line, and to leave sufficient room to admit of the filling being thoroughly tamped along both sides of each pipe.

For waste or drain pipe where perfectly tight joints are not required, the pipe can be used without filling in sockets, but where tight joints are necessary, use cement mortar made of one-half each cement and good sharp sand. Where mortar is used, be sure to carefully wipe inside of pipe so as to leave a smooth surface, free from projections or lumps at the joints.

Tree Grows on Tower

A lone tree (soft maple) on the top of the 110-foot tower of the court house at Greensburg, Ind., is a curiosity which is said to have no duplicate in the world. There were formerly four trees, but when the court house was remodeled in 1887, the largest tree, then about 15 feet high, was removed as its size was thought to render the tower unsafe. Two others on the south side perished from the intense heat.

The grove on the tower is supposed to have been started by the wind blowing the winged maple seeds between the crevices of the slate shingles where, catching root in the sediments of dust and watered by the rain, they sprouted. The trees were first noticed sprouting more than 30 years ago, and the one remaining tree is now about 15 feet high, and four inches in diameter.

New Church for Piedmont

The Church of Piedmont, Rev. John E. Stutchell, pastor, will build a $25,000 open air church with cloister walls near the home of Mayor Hugh Craig, on Craig avenue, Piedmont. The architecture will be of the 15th century period. A corridor running around the interior court where services are to be held will contain a library, rest room and art gallery.

OBSERVATIONS
PERTINENT AND IMPERTINENT
By BILL WISE

The Worm will Turn

The policy of Oakland in excluding outsiders from benefiting by their local developments and trade has led to a contrary slogan, "San Francisco jobs only for San Franciscans." The business men in San Francisco claim that frequent delays in reporting for work by their employees in the morning by reason of "just missing the boat" justifies this stand. Of course, if Oakland becomes part of San Francisco this embargo might be raised.

* * *

How Some People Waste Their Money

Building Material Men are complaining about a claimed "United Official Building Laws" publication, with offices in the Lick building. One manufacturer says "I cannot find any office in the Lick building and the union, who were supposed to endorse the proposition, say they know nothing about it. They have sent me a bill for $35, although I knew I signed only for $15. What can I do in this matter?"

We don't know, dear brother, except to pay up and "charge it to experience." To know with whom you are dealing, is a safe law in business.

* * *

A Protest

Mr. N. Ellery on behalf of the Brick Builders' Bureau, an association of brick manufacturers representing an investment of $15,000,000 in clay product industries, has filed a protest against the present plans and specifications for the Stockton Street Tunnel. The claim is made that the cement people are unduly favored, to the exclusion of steel and brick, thus causing the city a loss of about $30,000, without increasing efficiency. Los Angeles has already changed in their city tunneling from concrete to brick lining and their example, it is claimed, should be a lesson to San Francisco.

* *

A Blow Beneath the Belt

A large wholesale dry goods house in the East has followed a policy of extending lavish credit to retail houses until like the proverbial "spider and the fly" the spoilers owned the smaller business, which became one of their branches. One large plumbing house in this city has caused considerable criticism by absorbing retail business and using these "Aliases" for securing competitive orders, of course, a manufacturer or wholesaler can "cut under" the sub-contractor (who has, perhaps, to buy of him) if he can put in an abnormally low bid through the retail house he controls or owns. This is so important a matter that The Architect and Engineer, who stands for "a square deal for all," proposes to throw more light on this iniquitous practice. The U. S. Court has ordered that the General Electric Company abandon the use of some 24 names of subsidiary companies under which they formerly conducted their lamp business, as this subterfuge was contrary to public policy and in violation of the trust laws. Perhaps the practice of our plumbing wholesaler may be similarly criticised when it comes under the inspection of the courts.

* * *

A New Ruling of the Union

The plumbers, especially "the small fellows," who used to work on the jobs themselves, can do so no longer. By the new ruling any proprietor of a business is prohibited from doing, or assisting in his own work. He can no longer handle the tools, whether he may eat his bread with his men, or smoke with them, or "shoot craps" with them, is not stated. He must keep to his office or superintendent's duties and no more can he figure in his own time as part of the profits. We believe that this is contrary to the Constitution of the United States, as it abridges a man's liberty of action, and a test of this ruling may be expected.

* * *

They Thought We Had Air Ships.

An eastern manufacturer wrote as follows to a San Francisco man whom they had appointed Pacific Coast Agent:

"We want you to divide your time between the various leading cities of the Coast, spending, for instance, every Monday in Seattle, Tuesday in Portland, Wednesday and Thursday in San Francisco and Friday and Saturday in Los Angeles." How he is to get from Los Angeles to Seattle, or from Portland to San Francisco over night, is not explained. Easterners do not realize that the distance from Seattle to Los Angeles is approximately 1500 miles, much of it over mountain land where 30 miles an hour is average speed. By the fastest train with close connections it would take exactly 50 hours to go from Los Angeles to Seattle.

HEATING AND LIGHTING

Plumbing and Electrical Work

The Future of Plumbing

By N. KNOWALT

IT matters little now what the plumbing business has been in the past; it is the future which concerns the trade most vitally. We may marvel at the lack of sanitary knowledge, now a part of every plumbers' stock in trade, but we cannot forget that the pioneers were in their day as fully abreast of the times as we of the present, and that they were patiently paving the way to the modern highly-developed conditions which exist today.

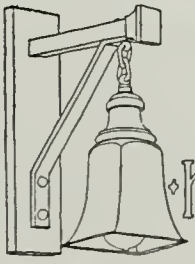
The original idea is only the beginning. If the man who conceives it was left to himself he would not be so apt to make substantial headway. It is the multiplicity of ideas that count. An unoriginal man after the first principle is made clear to him can frequently point out each succeeding logical step.

So it has been with the plumbing business. Not one mind, but many have grappled with and solved the problems, adding a little here and a little there, until we find the trade today in a splendidly developed condition.

But we have not reached the zenith yet. The next 10 years will doubtless witness many important changes and improvements, and what today seems approximately perfect, will be as strange then as the earlier work is now. But the principles are not so likely to undergo a marked change. They are too well grounded.

It is a safe prediction to say that the future of the plumbing business is going to be on a higher plane, that there will be more of it, and that it will prove much more profitable. It will also be better understood and plumbing will be in greater demand. Scarcely any one will be without it. A building of any kind without plumbing will be a rarity indeed. Plumbing will be just as essential as the cook stove or the gas range. The humblest homes will have their bath rooms, lavatories and stools. There will be more work for the plumber and he will handle it with more skill and profit, because the plumber will know his business better than he ever has before. In this respect he is bound to average higher. If he fails to realize this and meet the issue squarely, he will fall behind in the race. The opportunity is going to present itself and the plumber must be wide enough awake to grasp it and turn it to his use.

In order to meet the new conditions, the plumber must be as competent as the average business man in other lines. Guesswork must be eliminated. His



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success will be contingent upon his ability to figure each job intelligently so as to produce a profit. Better work will be demanded of him because the common demand for plumbing will give the public a better knowledge of the requirements, a thing the public is just beginning to learn.

Scientists and physicians, states and cities are engaged in a constant effort to educate the people to a responsibility or better care of general and individual health in every community. The plumbing business is closely allied to any movement having this result as its object. As this movement progresses the plumbing business will increase and progress with it.

One of the most recent steps indicating the trend of public sentiment in this regard is the widespread agitation for the abolition of the deadly public and semi-public drinking cup. This of itself will produce hundreds of thousands of dollars' worth of business because as one state legislates in this matter, other states will follow until there will not be a state in the union which does not prohibit the public cup.

The time is not far distant when municipalities will provide certain limits in which privy vaults will not be permitted, if this menace to health and decency is not completely abolished. False modesty regarding these vaults is one thing which prevents open agitation, as in the case of the drinking cup. In this day of civilization and sanitary plumbing, vaults should be forbidden in every town and village having sewerage and waterworks.

While it is clear that great benefits will accrue to trade through the services of health departments and the law, there are other channels whose influence for betterment is bound to be felt.

Education and agitation have done much in the past and present to aid plumbing and will continue to do so. They have resulted in the establishment of public baths and public comfort stations. They are springing up all over the country. Before many more years elapse they will everywhere be considered in the light of civic necessities. Each in its way helps plumbing. Once you educate the individual in the joys of bodily cleanliness—he is like the absinthe fiend—he can't feel right without it. The public baths have taught thousands this joy. On the other hand the public comfort stations are teaching the people the comfort and convenience of odorless toilet rooms.

Accustomed to these latter-day conveniences in this school life the child of the present wants them in his home. If he can't have them today he is quite certain to have them when he himself becomes a home-builder.

Every hotel and public building is a silent solicitor for plumbing orders, because every man, woman and child who sees the benefit of sanitary plumbing in these buildings, is unaccustomed to them in their own homes, are inspired to secure them. The percentage of hotel rooms equipped with baths has greatly increased in recent years, and it will not be surprising if every guest room is so fitted in the future.

It is not so many years ago that in towns of from 10,000 to 20,000, bath rooms, etc., were found only in the homes of those considered well-to-do. How different today. They are found in thousands of homes. A property is specified as "modern" only when it is equipped with toilet and bath, no longer considered a luxury. They are necessities now, but luxurious necessities. In future scarcely any house will be considered too small and inexpensive for this equipment. It will be a short-sighted man who fails to take plumbing into account when he builds. Every year the masses are more keenly anxious to enjoy the comforts which go hand in hand with modern plumbing.—The Plumbing Trade Journal.

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Some Federal Observations of Steam Boilers

The United States Bureau of Mines makes the statement in a bulletin just issued that the present steaming capacities of steam boilers can be tripled or quadrupled by forcing over the heating surfaces three or four times the weight of gases now passed over them.

"With well-designed mechanical-draft apparatus this greater weight of gases can be forced through the boilers at small operating cost," the bulletin states. "It is possible to increase the capacity of many of the present boilers in this way without reducing their efficiency much; in fact by proper arrangement of the heating surfaces the efficiency can be made higher than the present rating. The efficiency of any boiler can be increased by arranging its heating surfaces in series with respect to the path of hot gases. New boilers of high efficiency can be constructed by making the cross section of the gas passages small in comparison with the length."

These statements are contained in Bulletin 18, the Transmission of Heat into Steam Boilers, the authors being Henry Kreisinger and Walter T. Ray. The investigation of the transmission of heat into steam boilers is one of several researches now being carried on by the Bureau of Mines that have for their object the testing of methods by which the mineral fuels in this country may be used more efficiently. A better understanding of the laws governing heat transmission into boilers will result in the design of more efficient boilers, and more efficient boilers will reduce waste in the use of fuel.

The bulletin contains the following:

"Nearly a hundred years of practical investigation of boiler and furnace problems has resulted in little advance. Perhaps the main reason why many of the investigations failed to bring about progress was that boiler and furnace were considered a unit and were investigated together. Various combinations of boilers and furnaces have been built and tested without thoughtful planning. Many of the published results of such tests confuse the performance of the boiler and the furnace in such a way that it is difficult, if not impossible, to tell which of the two should be blamed or praised for the poor or good results obtained from the combined apparatus. Evidently, many persons have thought that the combined efficiency could be greatly increased by some mysterious manipulation.

"The principles governing the combustion of fuel in boiler furnaces and the absorption of heat by boilers have been little understood. The dogmas that the area of grate should have a certain ratio to the area of the heating surface, and that it takes 10 square feet of heating surface to make one boiler horsepower, seemingly had become so thoroughly fixed in the mind that they were hardly ever questioned. It is only within the last decade that a few engineers have broken away from the old rule of thumb methods and have begun to investigate the functions of the boiler and furnace separately. Their studies seem to mark the beginning of advance in steam-generating apparatus.

"The boiler is the metallic vessel that contains water and steam and absorbs

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heat; consequently it should be studied as a heat absorber.

"The furnace is that part of the steam-generating apparatus in which the potential energy of the coal is changed into heat; consequently it should be studied as a heat generator."

Copies of this bulletin may be obtained by writing to the Director of the Bureau of Mines, Washington, D. C.

About Building San Francisco's New City Hall

Leading San Francisco contractors have assured Mayor Rolph that the $3,500,000 city hall can be completed by 1915. This good news followed a conference in which the mayor, consulting architects and contractors agreed upon a plan whereby the construction of the monumental building will be placed in the hands of the least possible number of contractors.

This will eliminate the confusion and delay which has attended the building of other large city institutions, notably the new San Francisco hospital group. More than 100 contracts were let for the hospital buildings, resulting in a tangle of building operations, innumerable delays and extensions of time and a staggering deficit which must be met by a new bond issue.

The contractors agreed with Rolph and the city architects that the city hall could best be built with not more than 14 contracts and possibly 12. This will prevent one contractor being forced to wait for one or a dozen others before he can begin part of the work on time and will kill the practice of shifting responsibility.

Another important point decided upon was that no contract for the building would be let until complete working plans and specifications are prepared. These will be completed, it is expected, in time for work to commence in January.

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Licensing Architects

There is a strong and growing sentiment in favor of licensing architects, and this is being manifested in many ways. Recently a list of questions, selected with the greatest care, were submitted to various examining boards, including those in the States of Illinois, California, New Jersey, Colorado, Louisiana and Utah, and likewise Quebec and Manitoba, Canada. From the answers received the indications are clearly in favor of licensing architects.

It appears that such laws have found favor in those States and provinces where they exist, architects almost unanimously indorsing them. It has had the effect of breaking down professional combinations, such as "architect and contractor," "architect, builders," etc. This is a consummation devoutly to be wished, since one trade or profession is enough for any man. Since these laws went into effect State universities and technical schools, appreciating their importance, have revised their courses of instruction to meet demands.

From the answers received it quite clearly appears that such laws have operated to increase competency in designing and planning, while tending to develop a higher moral standard. One who presents himself for examination to secure a license must needs be well prepared or suffer the humiliation of failure. This of itself is highly beneficial, since it leads to study and a review of former studies. Perhaps the more practical and forceful thing suggested in the answers is that the law establishes a standing for the licensed architect, and holds up the unlicensed, hence questionable man, to the view of those desiring to build, thus affording them quite a measure of protection.

Where such laws exist a higher order of architecture is gradually developing, and freak buildings are less frequently constructed. The survival of the fittest is a law of nature, and ought to be one of business and professional life, but this is not always true. "Quacks" and "shysters" do a vast deal of harm, and that in spite of the fact that physicians and lawyers must secure licenses predicated upon a regular course of study. If licenses were not required and any man could "hand out a shingle" and practice law or medicine, this evil would be greatly augmented. With the general licensing of architects the quacks would largely find themselves without an occupation and would be forced to return to their old occupations of wielding a trowel, shoving a jack plane and the like. Let us, from an architectural standpoint, separate the sheep from the goats.—American Contractor.

Contract Not Yet Awarded

Society Reporter—I hear that you are making plans to get married in this country.

Count Nogoodsky—Ah, what shall I say? Making ze plans? No, no, I haf had ze plans prepared ze long time. I am now busy—what you say?—taking ze estimates.—Judge.

Lady Customer (in furniture shop)—What has become of those artistic sideboards you had when I was last here? Salesman (smirking)—I shaved 'em off, madam.

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By the Way

Some Industrial Information Worth the While

A Substitute for Turpentine

A product known as "Near Turpentine" and said to possess all the merits of the gum turpentine, is being put on the San Francisco market by the Felix Gross Company of 440 Ninth street, San Francisco. It is a mineral spirits, having a natural affinity for lead and oil, contains no acids, alkali or petroleum greases, and is said to be a perfect distillation and not a mixture. Among the largest users of the product are the Pacific Coast Steamship Company and the City of San Francisco. The engineers of both these corporations are loud in their praise of the material. Among the many other features, one particularly recommends it as a substitute for turpentine, is the fact that after use in a closed room, no odor is perceptible. The Gross Company now handle the entire line of the Hydro Carbon Company's products, besides their asphaltum, gravel, etc.

Roebling Company Opens Los Angeles Branch

The Roebling Construction Company, whose Pacific Coast headquarters are located in San Francisco, where the company has been manufacturing expanded metal lath and accessories for the last six years, has opened a branch in Los Angeles. The company has taken a 6-year lease of the building at 345 E. Second street, where it will carry a full line of expanded metal lath, corner bead, channel iron, tie wire, and also a complete line of wire lath for exterior plastering. The Roebling expanded and wire lath is made and sold in rolls instead of sheets, to eliminate waste of lath in lapping, loss of time and expense in tieing between studding, and to secure greater rigidity, the latter a feature appealing to the plasterer, who likes to work on a continuous smooth surface. The company also manufacturers expanded metal strips in rolls for bonding hollow tile.

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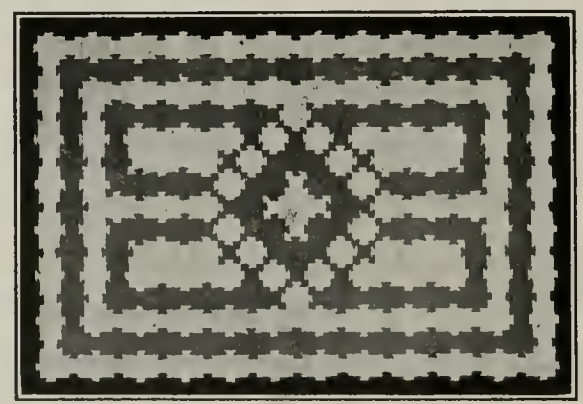

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The Los Angeles branch is under the management of Chas. Holloway, Jr., and O. L. McClellan. Mr. Holloway, has been connected with the Roebling company at San Francisco for four years, and left with reluctance a wide circle of close friends in the building world of that city. Mr. McClellan has been connected with the Roebling company for twenty years, the last ten of which were spent in the City of Mexico, where he was in charge of the company's business there.

Officers of Pacific Highway Association

The Pacific Highway Association which convened in San Francisco last month, will meet at Vancouver next year. The new officers of the Association are as follows:

President, Judge J. T. Ronald, Seattle.
Secretary, Frank M. Fretwell.
Senior Vice-President for Alaska, Falcon Joslyn, of Fairbanks, Alaska.
Senior Vice-Presidents for British Columbia, A. E. Todd, of Victoria and F. R. McD. Russell of Vancouver.
Vice-President for Canadian Yukon, Alfred Thompson, Dawson.
Senior Vice-Presidents for California, A. G. Briggs, San Francisco; F. W. Jackson, San Diego.
Senior Vice-President for Oregon, Frank B. Riley.
Senior Vice-President for Washington, Samuel Hill, of Marysville.

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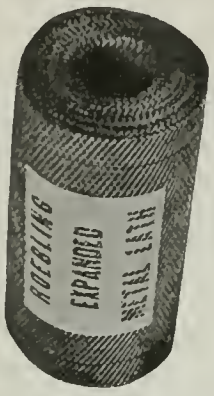

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Cement and Metal Coatings

The continued and rapid growth of the use of cement in the building industries has brought about many changes, and in many instances, has created a field for materials which, of necessity, must be submitted to various tests in order to determine their adaptability to the purpose for which they are recommended. An instance of this kind is recorded in the needs of the new California state buildings, among others being the new Armories at San Francisco and Sacramento, the Home for the Blind, and the Santa Barbara Normal School. For each of these buildings it was decided to take advantage of some of the materials which were presented to the specifying board for metal coatings, the principal object being to overcome the tendency of all metal, when exposed to the elements, to rust.

In order that the merits of the different materials could be determined, those agents which are known to be great rust producers, such as nitric acid, muriatic acid, hydrochloric acid and sulphuric acid were separately used on each of the materials submitted for the test. The test consisted of immersing metal coated as per specification, in a nitric solution of 30%, for one-half hour, and of an intense acid-fume test, (this being done by placing pieces of metal, each of which had been coated according to the manufacturer's directions in an air-tight, glass receptacle, and hung directly over the goblet from which were emitted the acid fumes). This test was conducted with each of the above named acids separately for a period of seven days before the final report of the testing engineer was rendered. Now seven days may not seem long for a test of this kind, but when the same is computed scientifically, we find the metal which was coated with Glidden's acid proof coating would have to be exposed to the elements for a period of a great many years before any indications of rust would appear.

The State of California has decreed that all exposed metal in its public buildings shall be treated at the shop before being delivered on the job with a material manufactured to prevent rust. In other words, an acid proof coating, in the specifications of the buildings above referred to, Glidden's acid proof coating is specified as the standard, having passed the test most successfully. These tests were most severe, were conducted in a very impartial manner, and the winner of them justly feels proud of his material.

Liquid Cement Coating

The architects on the new Bankers' Hotel of Oakland, after carefully considering the different cement coatings before letting the contract for the cement belt courses and bases of this magnificent hostelry, finally decided upon Glidden's Liquid Cement Coating as the best of those presented. These materials, with the Green Label Brand of Varnishes and Specialties manufactured by the Glidden Varnish Company of Cleveland, Ohio, are carried by the Whittier Coburn Company of San Francisco and Los Angeles, and are winning a high place among discriminating architects and engineers throughout the United States.

J-M Transite Asbestos Shingles

The H. W. Johns-Manville Company announce that after considerable experimenting they are prepared to offer a new form of J-M Transite asbestos shingles designed to fully meet the idea

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of architects as to a more artistic asbestos shingle.

These new asbestos shingles will be a full quarter inch thick, twice as thick as any other asbestos shingle offered today; and instead of the edges being smooth and uniform they will be finished slightly irregular or rough.

This extra thickness and rough finish will not only enable the builders of high class residential and business structures to secure a more artistic roofing but one that is also more durable and fireproof.

Other advantages claimed for asbestos shingles are that they are weather-resisting; weigh less than slate or tile and consequently do not require such heavy roofing timbers; are not fragile like slate or tile; do not split, crack, or exfoliate when exposed continuously to extremes of weather; will not rot, corrode or decay, and do not require painting or any other up-keep expense.

The manufacturers offer these new shingles in such standard colors as Indian red, slate and natural gray, in sizes 9" x 18" for the American method of laying, and 18" x 18" for French or diagonal laying.

First course, "Starters," hip and ridge roll sections have also been designed to match in both thickness and color.

Kitchens vs. Kitchenettes

What constitutes a kitchen or a kitchenette is up to Police Judge Williams, of Los Angeles to decide. A suit has been brought by the city building department to determine whether the hundred or more apartment houses that have been built lately in Los Angeles have been constructed according to the state tenement law which provides that,

"In every tenement house hereafter erected an alcove in any room shall be separately lighted and ventilated and must conform to all the requirements of other rooms, and shall not be less than ninety square feet in area. No part of any room in a tenement house hereafter erected shall be enclosed or subdivided at any time, wholly or in part, by a curtain, portiere, fixed or movable partition, or other contrivance or device, unless such part of the room so enclosed or subdivided shall contain a separate window as herein required, and shall have a floor area of not less than ninety square feet; provided, however, that closets or alcoves of not more than twenty-five square feet floor area do not come within the provisions of this section."

A test case is being made against Mrs. C. H. Scarborough, who own an apartment house at 519 South Fower street, Los Angeles, who, it is alleged, is operating her building with kitchenettes having an area of thirty-five feet only. The offending party claims that a complete test case will be made and that it will have to be decided by a higher court.

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Sand, Rock and Gravel Plant at Niles, Alameda County, California

Meese & Gottfried Build Splendid Equipment for Rock Plant

AS stated in this magazine two months ago, the Niles Sand, Gravel & Rock Company has recently completed a fine plant at Niles, Alameda County, and is now actively engaged in serving the building public. The following description of the plant will be of considerable interest. Before determining upon a design, Howard C. Plummer, Secretary and Vice-President of the company, a thorough engineer, visited practically all of the modern gravel plants throughout the East with the idea of obtaining and incorporating all the good ideas and latest improvements he could find. The plant as erected has a rated capacity of 1000 yards of screened and washed gravel per day, but produces from 1200 to 1500 yards per day.

The type of plant is one where the gravel is obtained from the river bed, then elevated on belt conveyors to a height of some eighty feet, from which point it passes by gravity through the screening, washing and separating devices, finally discharging into the various bins located at the railroad track, ready for loading into cars.

The gravel is taken from the river bed and banks by means of a Lidgerwood excavator and brought to a large concrete hopper located over the main Meese & Gottfried Company belt conveyor, by means of large steel bottom dump cars which are operated by a hoist located on a turntable on top of the main hopper. This turntable is connected with a trestle work made portable. By having the hoist on the turntable and the trestle made portable the track can easily be changed to suit the location of the excavator in the river bed and thus always maintain a direct pull on the rope in hauling the cars.

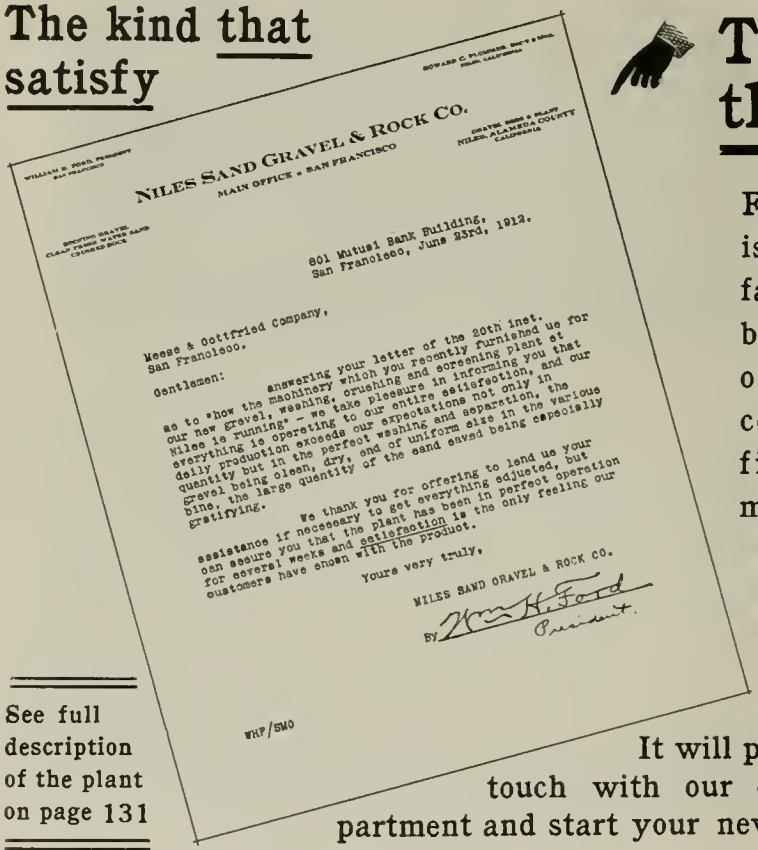
From this main hopper the gravel is fed by an automatic feeder to the main 30 inch rubber belt conveyor, approximately 285 ft. centers. This belt conveyor operates on an incline of about 18 degrees and delivers the gravel to a cross conveyor passing over the railroad to the screens above the bunkers; this conveyor is also 30 inches in width and about 50 ft. centers, and delivers the material to a battery of Meese & Gottfried Company conical screens.

When the material leaves the 30 inch cross conveyor just before passing into the screens, it is discharged into a hopper built in two compartments and arranged so as to split the material in two streams. The material is here mixed with water, and from this hopper the water, gravel, sand and foreign matter pass by gravity into the two first conical screens.

Above the bunkers there are ten of these conical screens and also two settling tanks. After the water and gravel have been delivered into the first set of conical screens, all gravel, etc., that passes through the perforations of the screens, and also the water is delivered by gravity through steel spouts into the small or forward ends of the next following set of screens.

Modern Elevating, Conveying Washing & Screening Plants

The kind that satisfy



NILES SAND GRAVEL & ROCK CO.
MAIN OFFICE - SAN FRANCISCO

601 Mutual Bank Building,
San Francisco, June 23rd, 1912.

Meese & Gottfried Company,
San Francisco.

Gentlemen:

Re to "how the machinery which you recently furnished us for our new gravel, washing, crushing and screening plant at Niles is running" - we take pleasure in informing you that everything is operating to our entire satisfaction, and our daily production exceeds our expectations not only in quantity but in the perfect washing and separation, the gravel being clean, dry, and of uniform size in the various bins, the large quantity of the sand saved being especially gratifying.

We thank you for offering to lend us your assistance if necessary to get everything adjusted, but can assure you that the plant has been in perfect operation for several weeks and satisfaction is the only feeling our customers have shown with the product.

Yours very truly,

MILES SAND GRAVEL & ROCK CO.

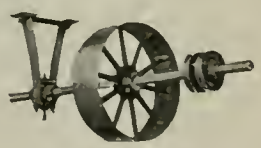
By Wm. H. Ford
President.

WHF/SMO

See full description of the plant on page 131

There's the Proof

For, after all, it is not the manufacturer's claim but the user's opinion which constitutes the final proof of merit.



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SEATTLE
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PORTLAND
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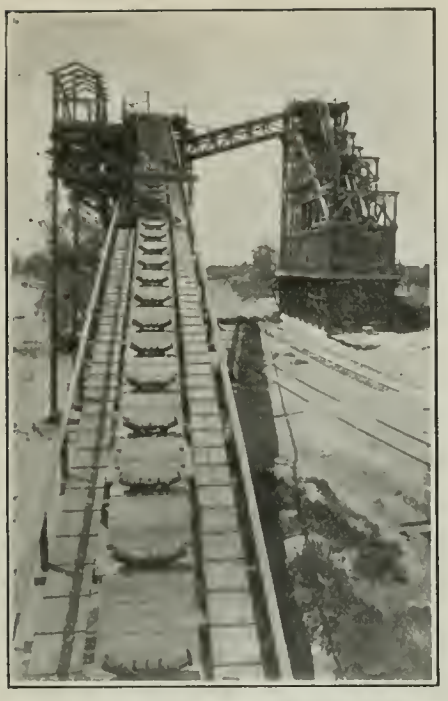

Steel Idlers for Main Belt Conveyor
(Belt not yet in position)

Every screen is provided with a pipe nozzle extending a short distance into it, and by this arrangement all the rejections must pass through a spray of clean water before leaving the screens. These nozzles are arranged so that the water used in giving the rejections the final washing will not go with the rejections in the bins but follows and mixes with the material passing through the perforations into the next screens, this process being repeated from one set of screens to the next until from the last set of screens all the fine sand and water, together with all impurities which have been passing through from screen to screen are led into the separators and here the water and impurities pass off through an overflow; the sand after settling to the bottom of the separators being automatically discharged into the sand bin.

All the oversize or rejections from the first set of screens—material which needs to be crushed—pass by gravity through a steel lined chute located between the bunkers and the conveyor trestle to the crusher bin. From the crusher bin, which is directly under the 30 inch main belt conveyor, the boulders are fed through a heavy rack and pinion gate into the crushers and after passing through the crushers the material is fed on to a 24 inch belt conveyor which runs parallel with the 30 inch main belt conveyor, delivering the crushed material back to the 30 inch main conveyor, and so to the screens again for separation.

Through the above arrangement the company is now obtaining five separations of clean, washed gravel, and it will be seen from the foregoing discription that all material which is delivered to the plant will be washed and screened, the separators finally discharging all the fine sand into the sand bins. Nothing is wasted—even the water used in washing being piped to nearby orchards for irrigation purposes, while the dirt and impurities being found of value as fertilizer, are used for that purpose. In loading the cars for shipment, the bunkers are provided with several Meese & Gottfried Company "quadrant" bin gates with balanced car loading chutes arranged on both sides of the bins designed so that a gate can be opened with one hand while the car loading chute can be adjusted with the other hand. The "quadrant" gates are provided with cast iron hand levers and operate very easily against the pressure from the material in the bin on account of the arc of the gate overcoming any necessity of forcing the material back in the bins when opening or closing. The car loading spouts are counter balanced, so by this arrangement the work in loading the cars is reduced to the minimum.

The Niles Sand, Gravel and Rock Company was fortunate in securing control of a large section of the river bed and adjoining lands where the deposited gravel and sand is almost unlimited in quantity and of a very superior quality, being remarkably free from foreign matter injurious to concrete. The resulting product being clean washed, dry and perfectly graded and available at a point within easy reach of the large consuming districts, is the cause of the company's enviable success from the very start.

All the transmission, elevating, conveying and screening machinery used throughout the plant was manufactured by the Meese & Gottfried Company of San Francisco, Seattle, Portland, Spokane and Los Angeles, this concern having successfully competed against the eastern manufacturers of this class of machinery for many years, equipping as it has, many of the largest plants along the Pacific Coast.

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Vacuum Cleaning

A VACUUM cleaner consists of a suction producer for drawing the air, a motor for driving the suction producer, a receptacle for collecting and separating the dirt from air, and a hose and tools for directing the suction against the parts to be cleaned, also, in the case of stationary machines, a variable amount of piping is required. The suction producers may be either a fan, a diaphram pump, a reciprocating pump, or a rotary pump. The advocates of the Rotary Pump System claim that the diaphram pump is not durable, being usually a leather bellows, the pores of which become open from frequent bending admitting air with the reduction of suction and ultimate breaking, and that the reciprocating pump has the objections of excessive noise, due to the necessary use of the inlet and exhaust valves, together with rapid wear of the piston in case of light dust getting into the pump.

As the rotary pump has no valves, it is asserted that the wear is confined to the bearings at each end of the driver, which is called the rotor, and the half-round bronze pins forming the guides for the blades. There is no wear to the walls of the cylinder as the blades do not rub against it. The occasional replacement of blades and half-round pins involves very small expense.

In selecting a vacuum cleaner it is not enough to secure a machine that can be demonstrated to take up dirt—you must test its ability to satisfactorily renovate. Satisfactory renovation requires that the air be drawn through or over the carpets or fabrics in sufficient volume and high enough velocity to carry the dirt with it. Low vacuum means the collection of surface dirt, while high vacuum with volume means the collection of surface dirt and deep renovation. The vacuum given by a machine with the inlet closed is not a measure of its ability. The same results can be obtained from a bicycle pump. The vacuum machine giving the highest vacuum with the tool on the carpet will be the best dirt-getter.

The amount of air supplied and that required for the various conditions is a measurable quantity. Referring to "Kent" on the "Flow of Air and Water through an Orifice," we find the formula the same in either case, leaving it necessary on the part of the one doing the figuring to compute the height of a column giving the same pressure at the orifice as a given column of water, remembering that the flow of air through an orifice varies as the square root of the vacuum.

One of the most successful candidates for popular favor in vacuum cleaners is the "Vak-Klean," which has been in successful operation for four years past and has been installed in such prominent San Francisco structures, as the Bankers' Investment building on Market street, at Geary, and the Mendel building, at Ellis and Jones streets. The "Vak-Klean" is a machine of the rotary pump type and is furnished in both stationary and portable styles. The stationary is furnished in one, two, three, or four sweeper plants, with air displacement up to 400 cubic feet.

The "Vak-Klean" uses silent chain drives. The pump and motor are mounted on a cast iron base. The separator is on a separate base. These bases have lugs with suitable holes for bolting to foundations or cement floors. Dirt separation is accomplished by what is known as dry separators, the air being drawn through woven fabric which catches the dirt.

The "Vak-Klean" is arranged to make the suction producer, the dirt collector and the motor separate units, any one of which is accessible for inspection or repair without interfering with the others. It also provides free ventilation of the motor, and these four points, from an engineering point of view, form a very important consideration.

The "Vak-Klean" vacuum cleaners, both stationary and portable, are handled by the Pneulectric Company, 452 Larkin street, San Francisco, and offer to furnish accurate information and measurements free to architects as to size machine required to secure best results, also to send copies of an approved form of vacuum cleaner specification.

Personal

W. Garden Mitchell and Charles E. Hodges, associate architects, have moved from the Monadnock building to larger quarters in the Bankers' Investment building, 745 Market street, and 49 Geary street, San Francisco.

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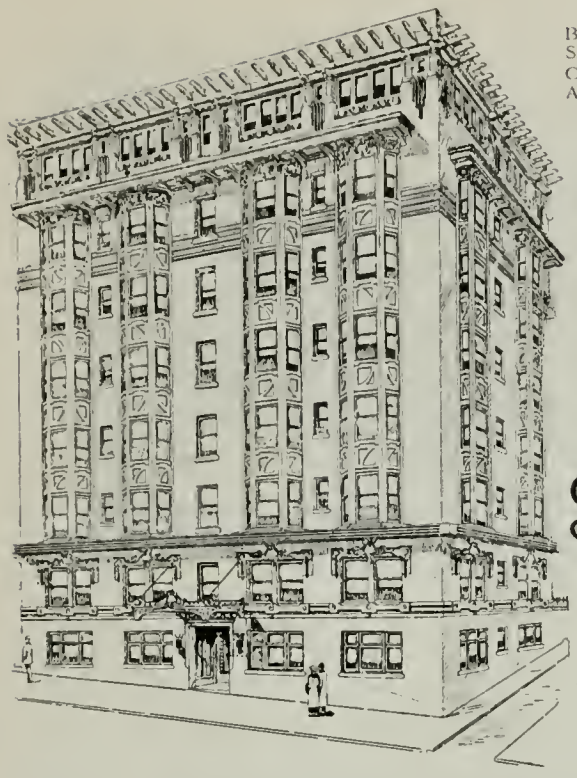

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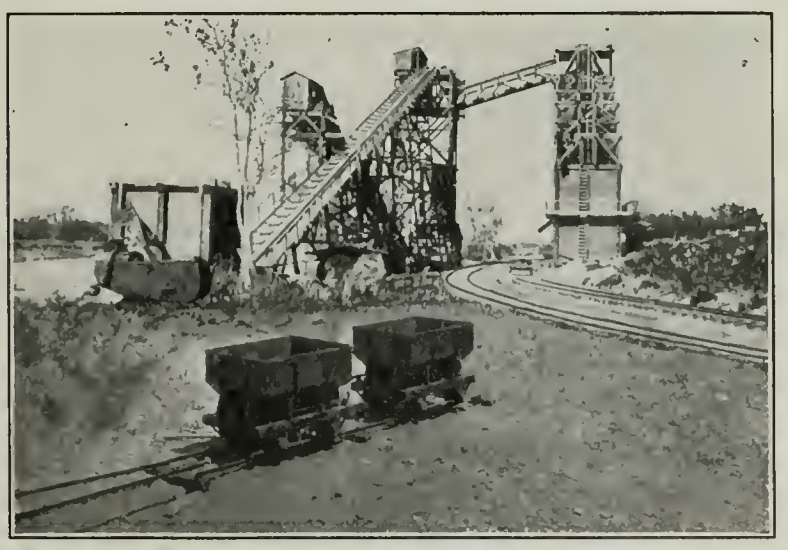

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View of the Oakland Hotel, in which two large size Double Deck "New Era" bread and pastry ovens have just been installed. Jorvis Oil Burner used to operate.

The "New Era" Ovens

The "New Era" oven has been manufactured for the past 30 years by M. W. F. Schaller and his father before him and is in use in many of the leading hotels, bakeries and restaurants throughout the country. Something like 114 ovens have been installed on the Pacific Coast, the last one being in the new Oakland hotel, where two double deck ovens, costing $3,000, have just been completed. Two new ovens (costing $3,600) are now being installed in Jore & Bauske's building at Third, near Folsom street, San Francisco, and one for D. H. Wulsen at Sanchez and Dorland streets.

Architects are so frequently called upon to specify a bread or pastry oven for hotel, bakery or restaurant kitchens in new buildings planned for catering purposes, that they will be glad to know of the advantages of the "New Era" oven, which has its office at 2560 Sutter street, San Francisco.

This oven is built with a hollow air space under the baking chamber, into which there is no direct circulation of heat. The heat which does the baking is radiated from all sides by the tile and is not a direct heat. The firing needs be done but once a day, and does not interfere with the baking, which can be continuous both night and day. The ovens are made both single and double deck and the inside measurements vary from 8 x 10 to 12 x 14 feet.

There are "New Era" ovens now in use which were built 30 years ago and it is claimed that these ovens will last a life time. The "New Era" Oven Company have a corps of experienced oven builders in their employ, so that architects may feel sure that any contracts awarded them will be free from faulty construction. Any kind of fuel can be used with these ovens. On the Pacific Coast, crude oil is found to be most satisfactory.

The following is a partial list of Pacific Coast installations:

	No. of Ovens Built
Young & Swain Baking Co., S. F. Cal.	4
Twentieth Century Bakery, San Francisco, Cal.	3
Renon Co., San Francisco, Cal.	2
The Goldberg-Bowen Co., San Francisco, Cal.	2
The Palace Bakery, San Francisco, Cal.	2
The Pioneer Matzos Co., San Francisco, Cal.	1
E. Perott, Modern French Bakery, S. F. Cal.	2
The Star Baking Co., San Francisco, Cal.	1
The Pacific Matzo Co., San Francisco, Cal.	1
The National Pie Co., San Francisco, Cal.	1
M. Goldsam, San Francisco, Cal.	1
H. Stanke, San Francisco, Cal.	1
G. Schmiedt, San Francisco, Cal.	1
Mrs. M. Beaumont, San Francisco, Cal.	1
The World's Fair Baking Co., S. F. Cal.	2
Garajalde Bros., San Francisco, Cal.	1
The Spokane Baking Co., Spokane, Wash.	5
Davenport's, Spokane, Wash.	2
Sacred Heart Hospital, Spokane Wash.	1
Muenz Bros., Royal Bakery, Spokane, Wash.	1
The Modern Bakery, Spokane, Wash.	2
The Log Cabin Baking Co., Portland, Ore.	3
The New York Baking Co., Portland, Ore.	3
Stein Bros, Portland, Ore.	2
E. Christensen, Portland, Ore.	1
The Vegetarian Food Co., Portland, Ore.	1
H. Crowell, Everett, Wash.	1
Shelly Bros. Baking Co. Vancouver, B. C.	3
Dominion Baking Co., Vancouver, B. C.	2
D. W. Hanbury, Victoria, B. C.	2

	No. of Ovens Built
T. Kuhn, Martinez, Cal.	1
Ann Arbor Home Bakery, Sacramento, Cal.	1
Vienna Bakery, Sacramento, Cal.	1
Born Bros., Sacramento, Cal.	1
The French Bakery, Sacramento, Cal.	1
E. Spieler & Co., Coalinga, Cal.	1
The Southern Cal. Baking Co., San Diego, Cal.	4
H. Brunecker, Oakland, Cal.	1
T. C. Mellow Pie Co., Oakland, Cal.	1
Garajalda Bros., Oakland, Cal.	1
The Rio Vista Bakery, Rio Vista, Cal.	1
J. Lambert, Concord, Cal.	1
I. K. Miller, Pacific Grove, Cal.	2
The Atben Baking Co., San Francisco, Cal.	2
C. Deuble, Watsonville, Cal.	1
Mortizia French Bakery, Watsonville, Cal.	1
San Jose French Bakery, San Jose, Cal.	1
The Model Steam Bakery Fresno, Cal.	1
G. Messerschmidt, Juneau, Alaska	1
A. Bacon, Palace Bakery, Reno, Nev.	1
W. H. Rardon, Medford, Ore.	1
The Pioneer Bakery, Albuquerque, N. M.	2
Royal Bakery, Chehalis, Wash.	1
F. A. Swingle, Long Beach, Cal.	2
Burlingame Home Baking Co., Burlingame, Cal.	1
H. P. Grand, Visalia, Cal.	1

Another Cement Plant for California

A news dispatch from Salinas, says: A company incorporated for $2,500,000, headed by John M. Gardiner of Los Angeles has acquired 16,000 acres of land from the Bardin brothers near Salinas and will commence in October to build a large cement manufacturing plant two miles from Salinas. The company will next year begin the construction of an electric railway from the cement plant to Monterey, the principal purpose of the railway being to ship the product of the plant.

The proposition they show is based on an exhaustive report of James Dix Schuyler. Mr. Schuyler figures a dollar profit on every barrel of cement produced. He shows how a 10 per cent dividend can be paid on the stock and leave a great surplus each year if all the cement is sold that the plant is expected to turn out.

Mr. Gardiner says the plant will be erected about two miles out of town on land they have already secured and he expects operations will begin about the 1st of October. He says the compay will employ from 250 to 300 men.

New Work for Robt. W. Hunt

It is interesting to railroad companies of the United States to note that commencing August 1st, Robert W. Hunt & Company, Engineers, assumed the inspection of locomotives and passenger equipment for the Illinois Central Railroad Company. In addition to the superintendence of construction at the respective locomotive and car plants, their service will include the inspection at point of manufacture of various specialties entering into the construction of the locomotives.

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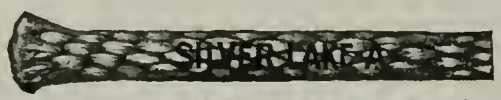

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No Competition for Auditorium

It is authoritatively announced that there will be no competition for plans for the new auditorium to be erected in the San Francisco Civic Center at a cost of $1,000,000. The plans are now being made by the Architectural Advisory Board composed of Messrs. Howard, Meyer and Reed. Plans for the municipal opera house and library will be selected by competition and it is expected that the program will be ready in the very near future. The competition will be confined to San Francisco architects.

POSITION WANTED—Expert stenographer, familiar with specification work, wishes position, half days only. Understands routine of an architect's office. Miss J. Dotta, 3561 Sacramento St.

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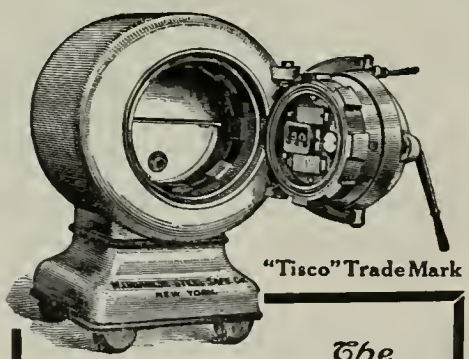

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A Revolution in Fireproofing

NOWADAYS fireproofing is synonymous with large expense. Many owners try to keep outside of the "Fire Limits" so that the rigid and costly requirements of a fireproof structure will not be exacted of them in any proposed building operations. Even when re-inforced concrete has been used, with metal sash and wired glass windows, the wood in trim and furniture becomes a constant menace and often leads to destruction. A new method of treating wood, paper, fabrics and textiles will shortly be introduced on the Pacific Coast by which wooden buildings can be made fireproof; treated window shades will be equivalent to wire-glass; wooden trim and furniture rendered non-inflammable and lace curtains, rugs, carpets, etc., made absolutely safe from the ravages of fire. This will make a wooden building more fireproof than the ordinary Class A structure and reduce construction expense to a minimum.

It has been stated that if all the buildings which are destroyed by fire in the United States each and every year were placed in a row they would extend from New York to Chicago.

This means a row of burning and burned structures, many of them several stories in height, more than a thousand miles in length. If the money loss entailed thereby were converted into silver dollars and these coins placed one on top of another this towering column of white metal would extend into the air a distance of 450 miles, or further than from New York to Buffalo. If these coins were placed side by side they would extend from the metropolis of America to St. Petersburg, Russia.

Out of disasters and reverses have come many developments that have made for human progress and improved conditions. Scientific minds throughout the world have striven for years to evolve and produce a practical relief which would afford protection both to our physical and industrial elements against that most terrible of all plagues, the "fire plague."

In chemical laboratories various experiments have been conducted. Many fire-resisting and fireproofing compositions have been produced, but while great progress has been made in the development and application of fireproofed construction in buildings, due chiefly to the substitution of metal, stone, firebrick, concrete and similar materials, instead of inflammable wood, the real solution of the fire problem has been generally overlooked, and that is the absolute necessity for fireproofing the lighter or more inflammable materials, such as wood, paper and all fabric and fibrous materials from which fires invariably have their conception.

A New York man named White, whose fortune had been swept away by fire, has since made a life study of the problem of fireproofing. After studying and experimenting independently for some years, he so interested the chemical staff of the College of the City of New York, that the use of a private laboratory was gladly and gratuitously offered him. For several years he carried on entirely at his own expense, researches at this location, and finally produced results, which seem to warrant the time, strength and money, which he has enthusiastically invested in his work.

The Safety Fireproofing Company, whose offices are in the Mills Building, New York, are now fireproofing various materials under the White patents and their methods and system have received the endorsement of the National Fire Protection Association, which comprises the leading Boards of Fire Underwriters, Fire Inspection Bureaus and Manufacturers' Associations throughout the U. S., as well as the American Institute of Architects, American Institute of Electrical Engineers, National Electric Light Association, National Sheet Metal Association, National Hardware Association; National Paint, Oil & Varnish Association, etc., etc.

Mr. Franklin H. Wentworth, the Secretary of the National Fire Protection Association, writes March 26, 1912: "The use of such fireproofing will increase as public education on the subject of fire prevention progresses." Mr. J. Albert Robinson, Sup't of this Association, made an exhaustive investigation and writes as follows, under date of March 15, 1912, regarding the tests made:

"One is rather used to having laboratory demonstrations of various kinds that are apt to work very beautifully under such conditions, but they may not work at all under practical conditions. The first demonstration, therefore, was as startling as it was practical. A pile of loose excelsior, fifteen feet long, six feet wide and five feet high, lay in a heap on the top floor of the plant, with a big box full of the biggest parlor matches obtainable, a vigorous attempt was made to set this excelsior on fire. After using over fifty matches, boring, tunneling, pulling and upsetting the excelsior in vain, the attempt was given up. This excelsior had been treated with the fireproofing solution. There was also a pile of baled excelsior containing over thirty standard bales, this pile had been sprayed as it stood, with the cold solution, with a common garden spray. A determined effort was made to fire this pile with matches, but without success.

"Treated papers, rolls of wall paper, bolts of cloth, such as cotton lawns, ginghams, etc., were sampled at random and an attempt made to set them afire. Even colored goods were saturated with alcohol, and the alcohol burned off without discoloration, this also being true of the white goods. Cotton bales and gunny sacks were similarly treated. Tissue papers of all kinds, were absolutely non-combustible.

"A most interesting feature of this material was demonstrated by the following tests. Cotton lawn, cheese cloth, etc., which had been treated,

were placed on an iron frame over a Bunsen Gas Burner. Raw cotton, paper, cloth, etc., which had not been treated with the fireproofing material but rather had been dipped in alcohol, were placed on top of the former materials without igniting. The latter were then subjected directly to the attack of flames and found to be fire resistive. The gases given off from the heated material which had been treated in turn rendered the non-heated material non-inflammable. This is a remarkable fact and offers opportunities of tremendous value. Treated cheese-cloth placed on the walls of a room and then covered with expensive wall paper would apparently protect the room from damage should a fire occur."

Mr. Robinson closes his report with this statement. "There is no disputing the fact that the use of this fireproofing material is fraught with great possibilities and may develop into one of the great factors in fire prevention."

The California Safety Fireproofing Co. has been incorporated with offices in Head Building, 209 Post street, San Francisco. Its manager is Mr. Albert Albrecht. A factory will be erected immediately in either San Francisco or Los Angeles for the manufacture of the fireproofing preparation and a radical change in methods of construction and fitting of buildings and a decided modification of present building laws is certain to follow, in order to adapt future building to these new conditions.

A Fire Test at Worlds Fair Grounds

The Rabbitt Fireproof Partition Co. have erected at the southeast corner of Baker and Chestnut streets a building equipped with one panel of their partitions, alongside of which is one of metal lath and plastered both sides. A demonstration by fire and water tests will be made in a few days at which leading public officials and insurance experts are expected to attend. A similar test in Los Angeles showed, it is claimed (and this claim is sustained by official reports), that Rabbitt Partitions were equal and in some respects superior to metal lath.

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OF INTEREST TO ARCHITECTS AND BUILDERS

THE extensive use of the telephone at the present time in hotels, apartment houses and office buildings renders it essential that some provision be made in buildings of these types to carry the large number of wires necessary for furnishing telephone service. When it is realized that in a number of buildings there are hundreds of telephones in service, and that it is necessary to carry two wires from each telephone to some central point in the building, the importance of making adequate provision for telephone wiring is apparent. If some arrangement is not included in the original building plans, it may be necessary to make extensive and costly alterations after the completion of the building in order to conceal the wires running through halls and rooms.

The Engineers of the Telephone Company will be glad at any time to give architects and builders the benefit of their experience in such matters and to assist them in planning the best system for each individual case.

THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY

Quantities Surveying

Editor The Architect and Engineer of California:

The article entitled "Somebody's to Blame" on page 133 of the July issue contains much of interest to myself and my work as well as to the profession and the man who is paying the freight that I simply cannot resist its appeal.

The condition is not one confined to your particular locality, but is prevalent throughout the country and there are few jobs, no matter how large and important or small and of ordinary construction, that do not entail at least a twenty per cent, list of extras, or for omissions and errors. You cannot place the blame on any particular individual or trade for this seeming uncalled for thing, but it exists, nevertheless, much to the chagrin of the architect and his loss of confidence among those who desire his services. It is a matter of methods among those who estimate and is clearly shown in the vast difference in the figures submitted by contractors estimating upon a piece of work, and however just the architect might be in drawing his contract and in the wording of his specifications, legally, he cannot expect a ten thousand dollar job for much less than that sum.

Quantities Surveying is the one method by which much of this much regretted condition may be eliminated—a department which I practice in New York City in conjunction with specification work. This feature is a development of the English field of the same recognized work, only over there it is considered most essential and is always done. The method employed in New York by our department operates thus:

The architect supplies us with a complete specification and set of drawings—or as nearly so as possible, for many times we reach totals on very meagre information—ambiguity, errors and omissions are thus checked before figures are taken. With this information he supplies us with a list of the names of the general contractors he wishes to have estimate upon the work. We supply the architect and the various general contractors with the survey of quantities and as each are alike they must all in that case figure very closely or at least the variance will be so slight that without much pain of conscience the architect may readily award the contract.

Each general contractor supplies his own sub-contractors with copies of the quantities pertaining to the special work he does, and, naturally, these figures also are very close.

To say that the service is efficient and satisfying in every particular would seem superfluous, for the reason that our success depends upon the accuracy of the work. It has not progressed as rapidly as it should because it gives the contractor no advantage over another, one figuring on the same work—that is its strongest feature. It increases the possibility for accuracy and consumes less time between issue of drawings and the return of figures, saves the architect's time, money, and office administration, in fact it only favors the architect and the owner—the real beneficiaries.

It does not cost the architect anything—the bills are paid by the successful bidder, since the fees for the work are an included item in the Bill of Quantities and no one is involved but the man who gets the work. It is only expected that the architect shall cover it by a

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clause in the specifications and contract and the amount to be paid incorporated therein, which may be either a lump sum or upon a percentage basis as may be determined by local custom or league of the profession. There are additional fees where adjustments are required or alterations and removals (one or both) during the progress of the work.

The article above referred to is unusual in that it is given so much publicity, but as I presume this is how you prefer to have these problems solved—by publicity and discussion, I feel compelled to point out a remedy that is well known, tried and curative. You must be in the work to readily understand how desirous the architect is to avoid just such conditions and how much time and trouble he goes to to try and discover how it occurs, finally he in many cases heaps himself with all this trouble and really loses much of the confidence he should have in himself and with no one to stand behind him at that time—this is something that has ruined many a promising man and caused many a successful one to fail. Quantity Surveying is a practical thing, a remedy, it is estimating beyond that point where the average contractor refuses or "guesses" to go. Build it up and if we can be of any assistance, command us.

Respectfully and sincerely submitted,
Very truly yours,
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Over Ten Billion Bricks

The clay-working industries of the United States had in 1911 a production valued at $162,236,181, according to the United States Geological Survey, which has just issued a chart, compiled by Jefferson Middleton, showing the total output, by states, of all the different clay products. The total production of common brick was 8,475,277,000, valued at $49,885,262. Of this New York contributed the largest amount, namely, 1,143,726,000, valued at $5,918,286. Illinois was second in output, with 1,074,486,000, but the product had the greater value of $6,126,911. No other state reached the billion mark, Pennsylvania coming third with 774,122,000 bricks. The chart gives the figures of production for other kinds of brick—vitrified brick, front brick, fire brick, etc.—as well as for terra cotta, drain-tile, sewer pipe, stove lining, and pottery products. The production of all kinds of bricks was more than ten billion.

In total production of clay products Ohio heads the list, with a value of $32,663,895, or one-fifth of the total for the United States; Pennsylvania is second, with $20,270,033; New Jersey third, with $18,178,228; and Illinois fourth, with $14,333,011.

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(From the San Francisco Wasp.)

THE San Francisco Board of Public Works, a purely municipal institution, coming directly under that provision of the charter requiring "all deputies, clerks and other employes to reside in the city, and to have resided here at least one year prior to their receiving employment," pays absolutely no attention to the above provision of our organic law.

Professor John Galen Howard, one of the three consulting architects appointed originally by the Mayor, who, in his inaugural message, acknowledged the force of the law, and suggested an amendment to the charter, which would repeal such provision, resides in Berkeley, at 2421 Ridge Road avenue. He is a Professor of Architecture in the University of California, receiving a regular salary of $5000, per annum, recently increased from $4000— and it is said, 6 per cent on all work for the State coming under his supervision. From this city he receives $25 per day and $2500 per annum as a starter. * * *

Mr. Charles Derleth, Jr., is down on the pay roll of the University of California as a Professor of Civil Engineering, and as such, receives a salary of $3300 per annum. He resides, as his account with the Board of Public Works shows, at 2845 Webster street, Berkeley, and receives for his services as consulting structural engineer the modest sum of $4 per hour, which, if permanently employed, means, just $10,000 per annum.

W. E. Leland, a consulting engineer in the Board of Public Works, receives a regular salary of $150 per month. He resides on Indian Rock avenue, Berkeley.

A. Appleton, a designer in the Board of Public Works, receives a regular salary of $225 per month, and is said to have moved over to this city within a month or two.

Melvin Earl Cummings is an instructor of modeling in the University of California. His pay is modest, to be sure, amounting to only $600 per annum. He is in addition thereto a Park Commissioner in this City, and while it is true that he resides on this side of the bay, yet so little does he care for the charter, that he has never filed his oath of office as required by law.

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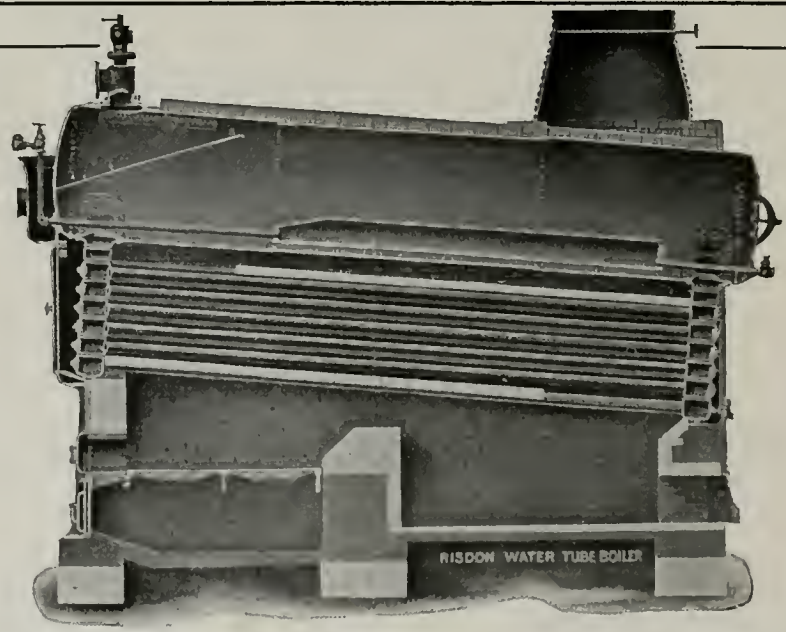

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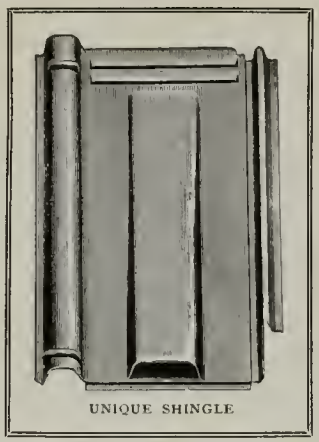

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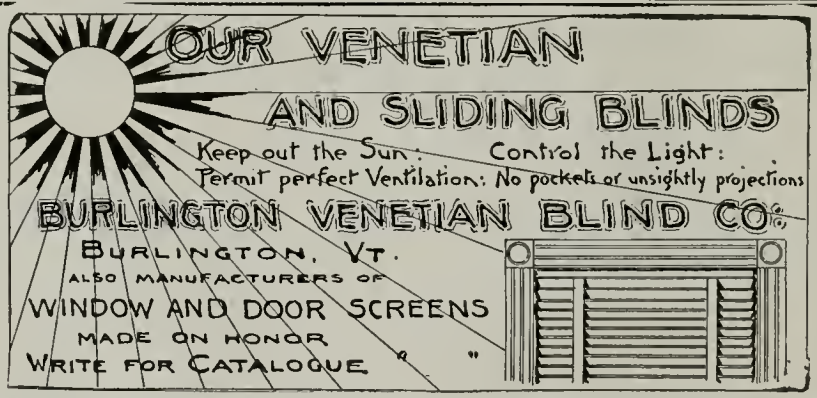

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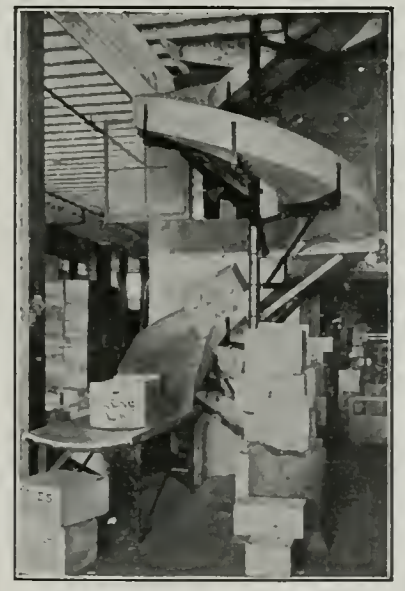

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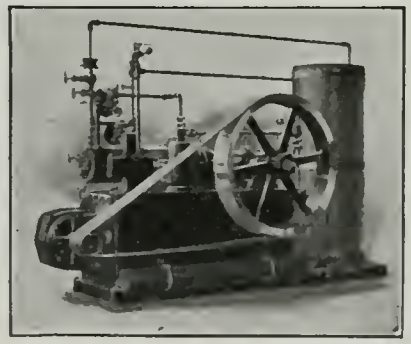

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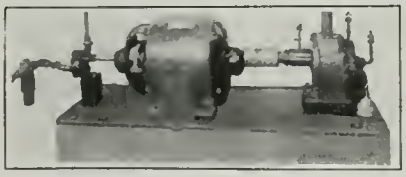

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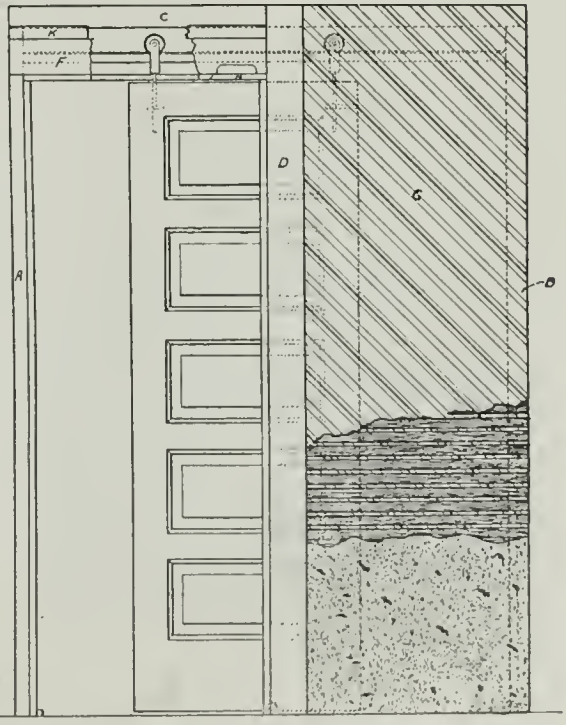

Fig 4

Ferroinclave The IDEAL CONSTRUCTION

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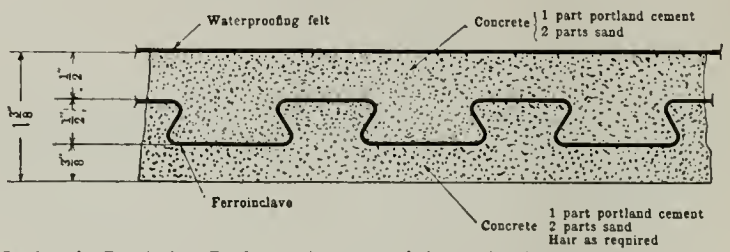

Section of a Ferroinclave Roof as used on spans of 5'-0" and under.

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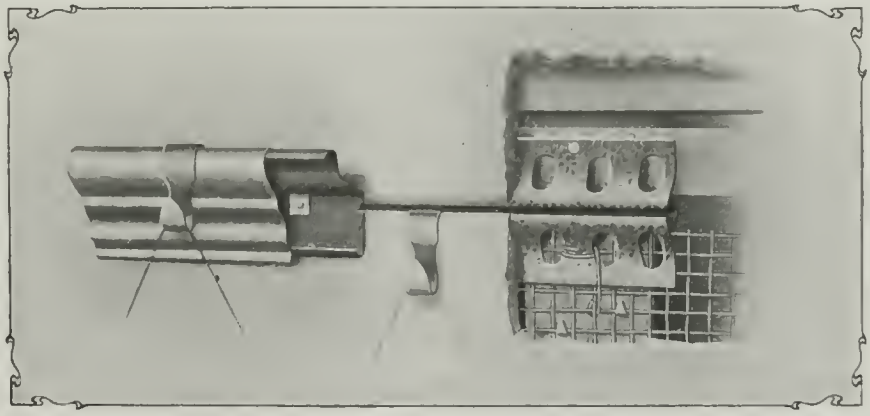

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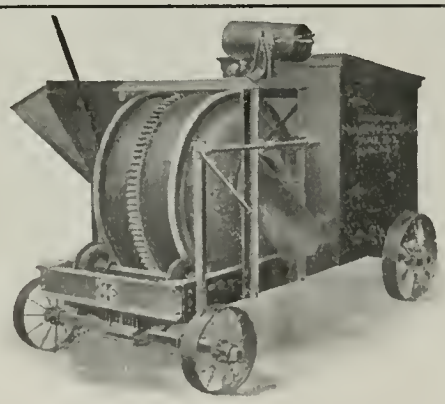

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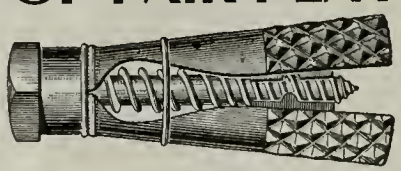

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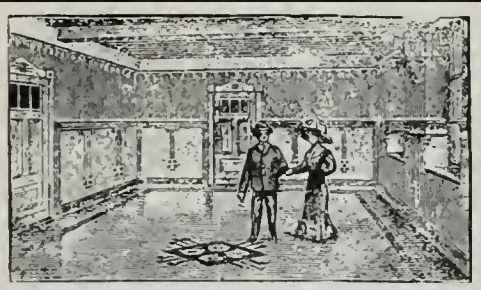

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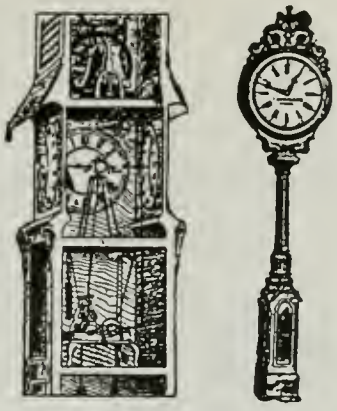

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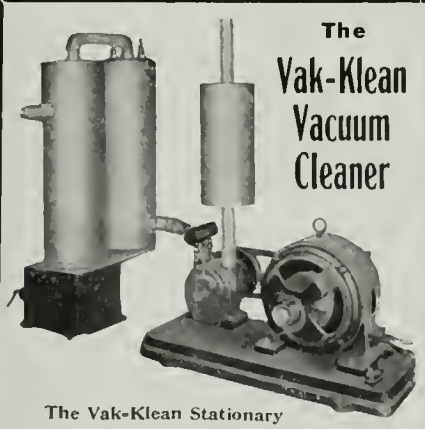

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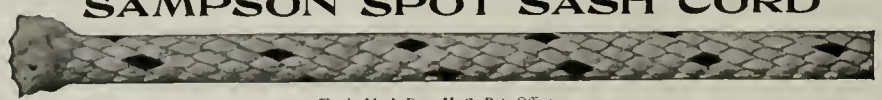
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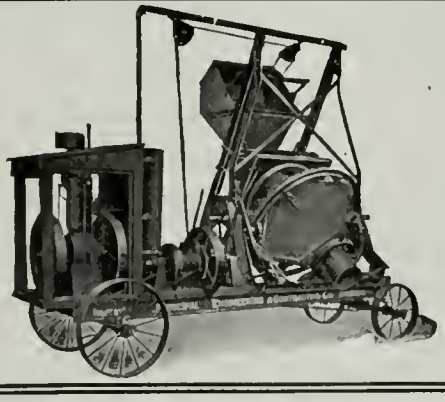

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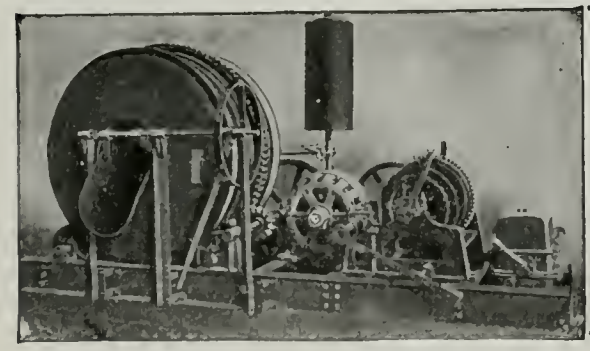

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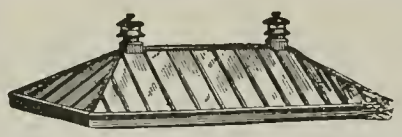

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This bar has been in public use for more than 14 years as the main feature of the

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ABSOLUTELY NON-BREAKABLE
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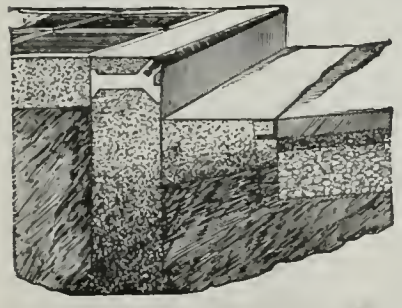

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CONTRACTORS can make money by laying this curb.
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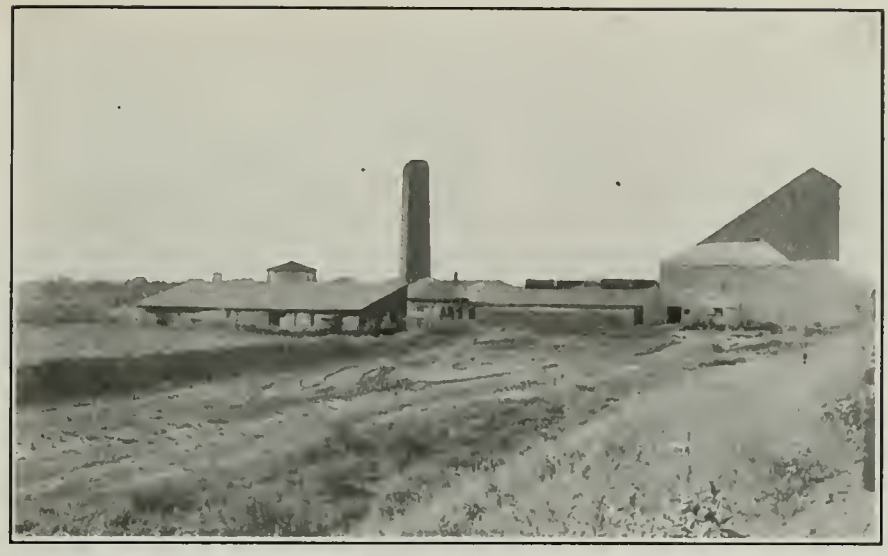

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THE plant of the Stockton Fire & Enamel Brick Company, is located at Stockton, California, about 80 miles from San Francisco.

The company was organized in 1907 and has made a specialty of the manufacture of fire brick, enamel brick, building brick and mantel tile.

The shipping facilities are unexcelled, as in addition to water transportation furnished by the San Joaquin River, three trans-continental railroads pass the Company's plant, while several electric lines run from Stockton into the surrounding country.

The factory is small but well equipped, being one of the few electrically operated brick yards in this country.

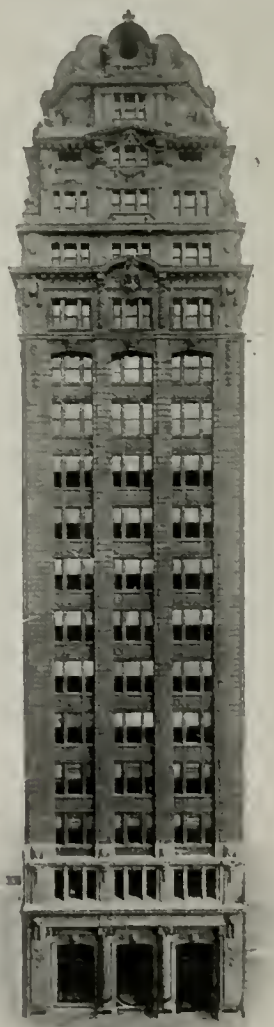
Nothing but high grade materials are made and the quality of its products has been so satisfactory that the entire out-put is sold for several months in advance.

THIS building represents the first Architectural Terra Cotta contract let in San Francisco after the great conflagration. But few persons of the millions who have seen this imposing structure know that from the third story window sills to the top of the dome all of the exterior is Terra Cotta made in imitation of gray sandstone. Many of the architects of San Francisco are still under the impression that it is stone and almost incredulous when shown their error.

As may be plainly seen the sandstone in the first two stories is fading while the Terra Cotta is as fresh and fast in color as the day it came from the kilns.

To architects who may still be skeptical as to the superiority of Terra Cotta and brick over stone we say "Look at three of our buildings which went through the fire and stand today as permanent monuments to the indestructible qualities of impervious pressed brick and Terra Cotta."

"They are the
Rialto
Monadnock
Grant
all faced with products of our own manufacture."



For samples of our impervious Gobelin brick and unequaled Reds, as well as specimens of our enameled and standard finished Terra Cotta for both exterior and interior effects, we invite your correspondence.

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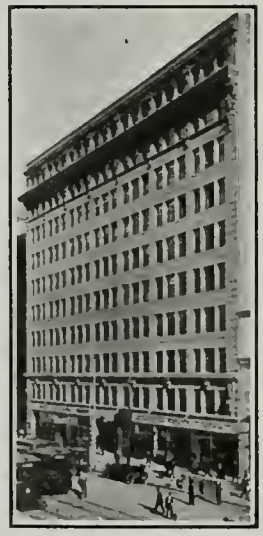
Architectural Terra Cotta and Pressed Brick

Factory: South San Francisco Office: Mills Building, San Francisco

Rialto Building, Mission and New Montgomery Sts. San Francisco. Meyer & O'Brien, Architects Erected 1903

ALL of the pressed brick and terra cotta in the exterior of these three buildings went through the great San Francisco fire of 1906 and remain in place today as originally erected.



Monadnock Building, Market Street, near Third, San Francisco. Meyer & O'Brien, Architects Erected 1905

Grant Building, Seventh and Market Streets. San Francisco. Newton J. Tharpe, Architect. Erected 1904.

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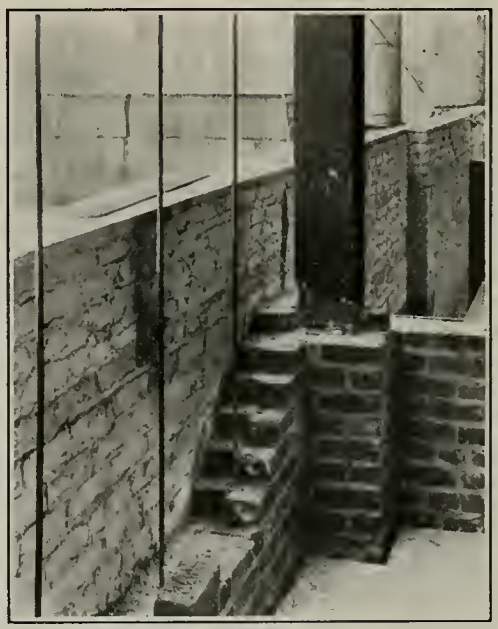

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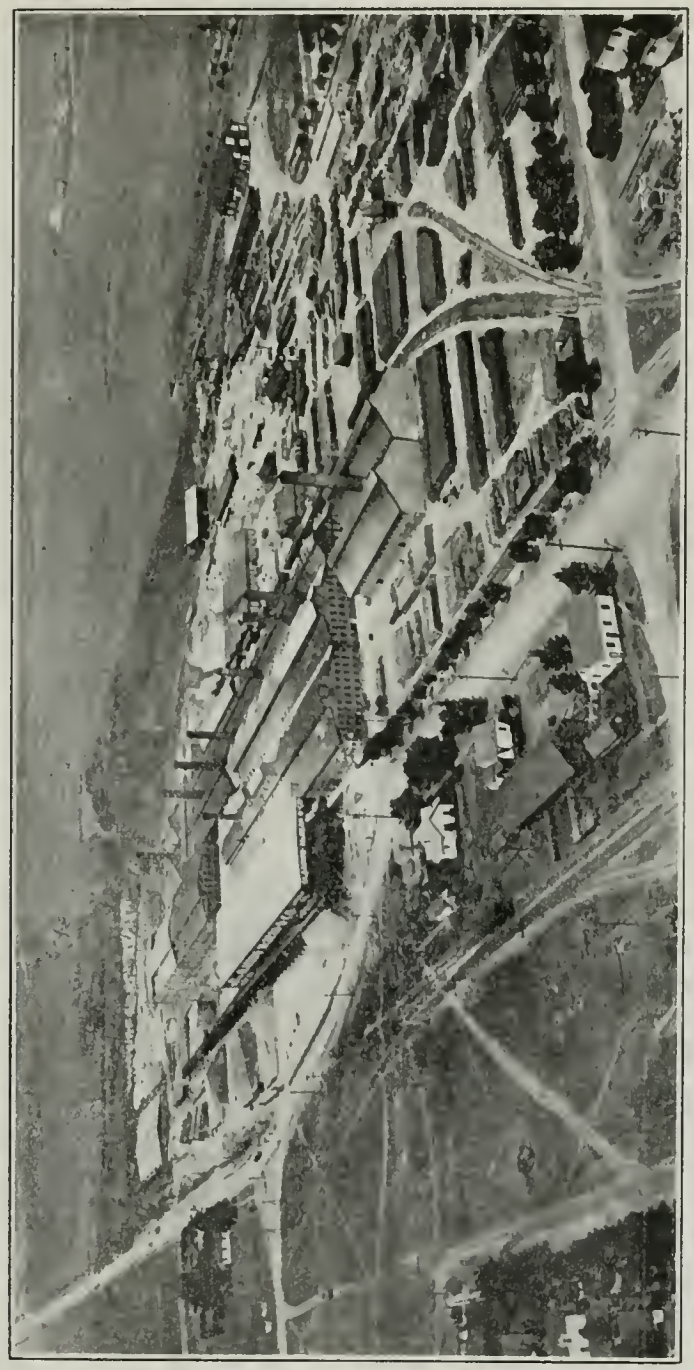
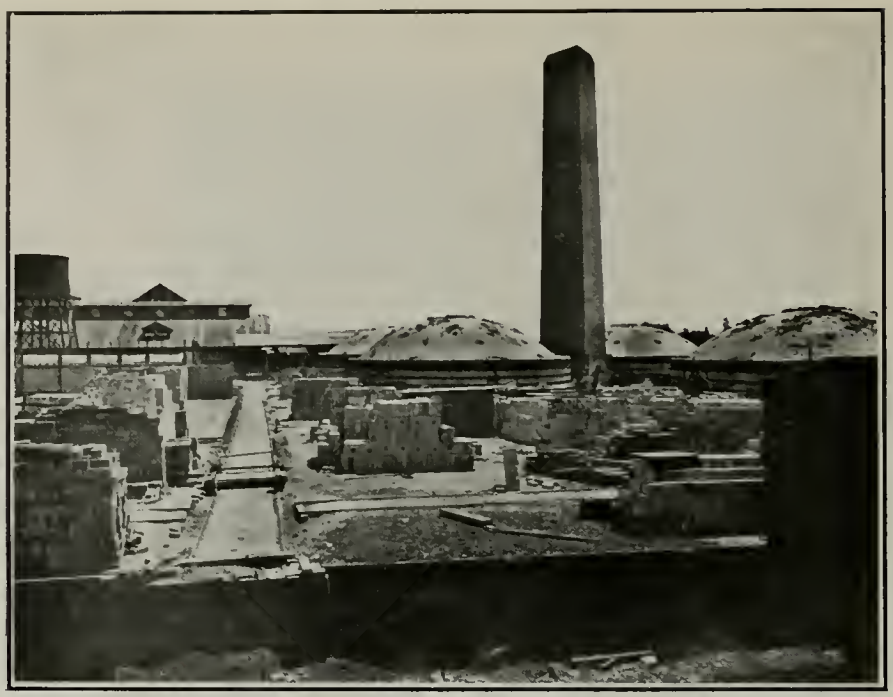


While a rapid physical development has occurred in all of the plants of the West Coast, perhaps the most phenomenal has been in the **GLADDING, McBEAN & COMPANY'S** property at Lincoln, Cal., which, located on its raw material is now numbered among the few great clay products factories on the Continent. A kite view illustrates its admirable and consecutively planned movement and circulation, necessary through the handling annually of some fifty thousand tons of product with approximately 600 men, and covering with its clay lands over 500 acres.



View Showing Some of the Kilns of the LIVERMORE FIRE BRICK COMPANY also Facilities for Rapid Loading of Product on Railroad Cars

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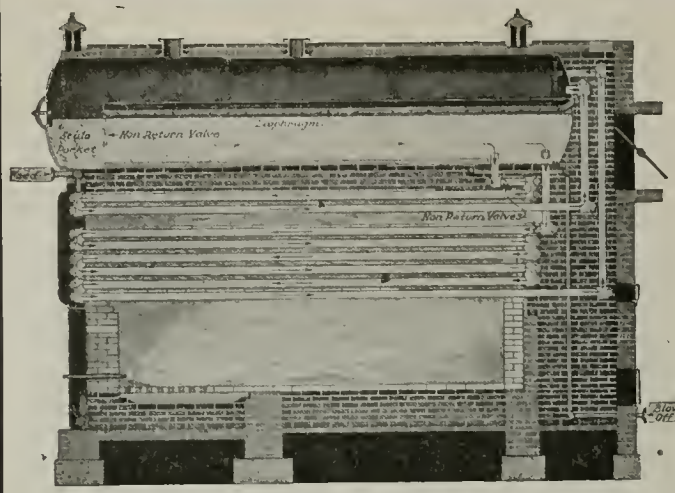

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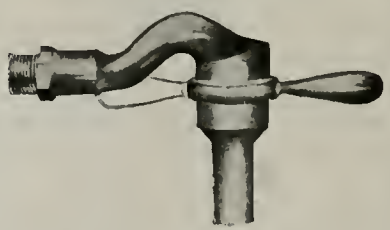

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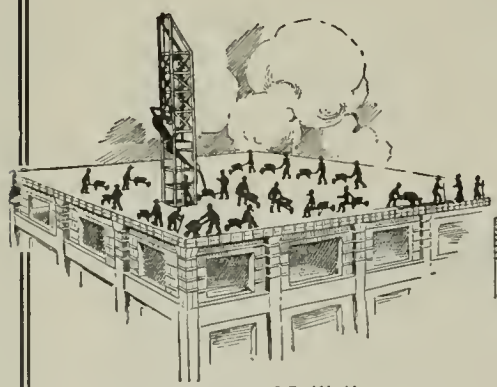

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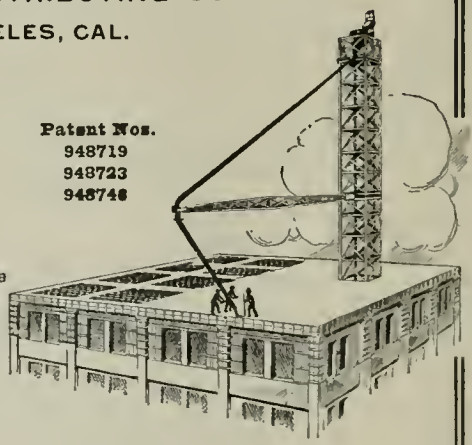

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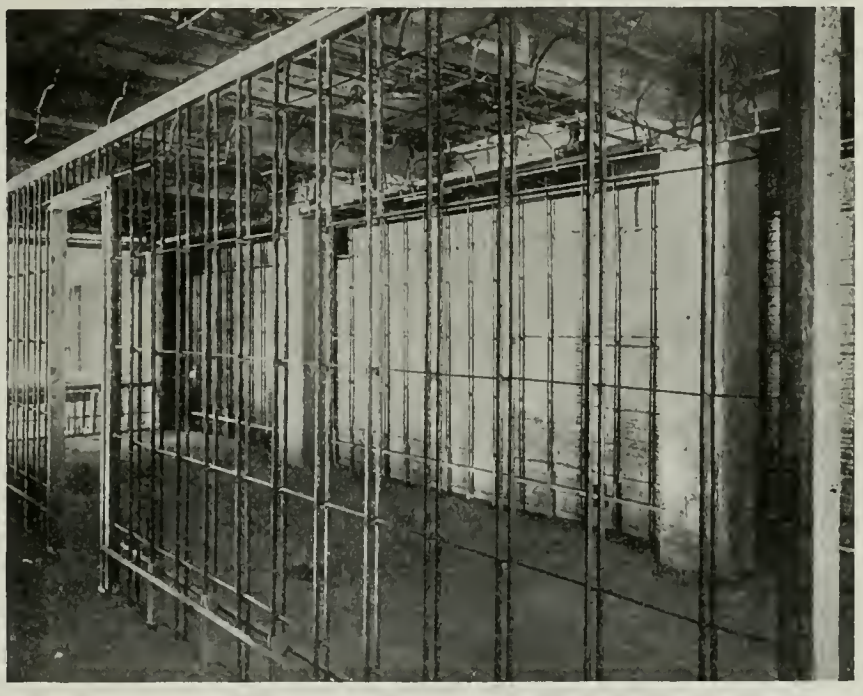

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RULOFSON METAL WINDOW WORKS

Eighth and Brannan Streets, San Francisco, Cal. Contractors and specialists in fire-proofing of openings. Contracts taken any place in the United States.

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BUSWELL'S Steel and Concrete Paints

A CALIFORNIA PRODUCT HAS MET ALL TESTS ASK US

Works and General Offices - - OAKLAND, CAL.

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BUILDERS' SUPPLIES
Boyd & Moore.....356 Market St., S. F.
Waterhouse & Price....59 Third St., S. F.
City Supply Co., Inc.,
Sixth and Channel Sts., S. F.

CAPITALS, MOLDINGS, ETC.
Western Builders' Supply Co.,
680 Mission St., S. F.

CEMENT
Atlas Portland Cement Co., represented by Western Building Material Co.,
430 California, St., S. F.
Building Material Co., The (Inc.)
583 Monadnock Bydg., S. F.
Boyd & Moore.....356 Market St., S. F.
Pacific Portland Cement Co., Pacific Bldg., S. F.
Standard Portland Cement Co., and Santa Cruz Portland Cement Co.
Crocker Bldg., S. F.
The Building Material Co., "Medusa White Portland" ....583 Monadnock Bldg., S. F.

CEMENT EXTERIOR WATERPROOF COATING
Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. [See distributing Agents on page 139.] Boyd & Moore.....356 Market St., S. F.
Petrifax Cement Coating, sold in San Francisco by Sherman Kimball, 503 Market St.
"Kabn System," Trussed Concrete Company, Rialto Bldg., S. F.
Biturine Co. of America,
24 California St., S. F.

CEMENT EXTERIOR FINISH
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents,
Fife Bldg., S. F.
Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. [See list of distributing agents on page 150.]
Glidden's Liquid Cement and Liquid Cement Enamel, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
"Wesco."—West Coast Kalsomine Co.,
110 Hansford Bldg., S. F.
Buswell's Steel and Concrete Paints
Oakland, Cal.
"La Farge," sold by Waterhouse & Price,
59 Third St., S. F.
Medusa White Portland Cement, California Agents, the Building Material Co., Inc.,
587 Monadnock Bldg., S. F.
Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

CEMENT EXTERIOR WATERPROOFING
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents.
Fife Bldg., S. F.

CEMENT EXTERIOR WATERPROOFING—Continued.
Glidden's Liquid Cement and Liquid Cement Enamel, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.

CEMENT FLOOR COATING
Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. [See list of distributing agents on page 150.]
Glidden's Concrete Floor Dressing, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.

CEMENT GUN
Lilley & Thurston Co., distributors for Northern California .....Rialto Bldg., S. F.

CEMENT TESTS
Smith, Emery & Co....651 Howard St., S. F.
Robert W. Hunt & Co.,
418 Montgomery St., S. F.
R. E. Noble & Co.,
Humboldt Bank Bldg., S. F.

CHEMICAL ENGINEERS
Smith, Emery & Co., 651 Howard St., S. F.
Robert W. Hunt & Co.,
418 Montgomery Street, San Francisco.
R. E. Noble & Co.,
Humboldt Bank Bldg., S. F.

CHURCH INTERIORS
Burlingame Cabinet Works,
509-511 Sixth Street, San Francisco.
Fink & Schindler.....218 13th St., S. F.

CLOCKS—TOWER AND STREET
E. Howard Clock Company.....New York
For Pacific Coast agents see advertisement.

COOLERS AND HUMIDIFYERS
California Air Purifying Co.,
276 5th St., S. F.

COLD STORAGE INSULATION
"Hydrex" Felt & Compound, manufactured by Hydrex Felt & Engineering Co., N. Y.; sold by Rolph, Mills & Co.,
Metropolis Bank Bldg., S. F.
Neponset Waterdyke Felt and Compound manufactured by F. W. Bird & Son, East Walpole, Mass.; sold by Parrott & Co.,
320 California St., S. F.

COMPOSITION FLOORING
Artolith Mfg. Company,
149 Turk St., S. F.
Fibrestone & Roofing Co.,
704 Market St., S. F.
H. M. Parry & Co., 145 Montgomery St., S. F.

CONCRETE CONSTRUCTION
Esterly Construction Co.....Berkeley, Cal.
Foster Vogt Co....722 Hearst Bldg., S. F.
Petersen, H. L. .....62 Post St., S. F.
Ransome Concrete Company,
Oakland and Sacramento
Van Sant-Houghton Company,
503 Market St., S. F.
J. M. White Company....101 Post St., S. F.

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Specialists in **FAIENCE MANTELS** and Designs gotten out for Architects in any Mantel or Floor Tile Work. Estimates gladly given. Complete line of Fireplace Fixtures. Visit our Store. **WATSON MANTEL & TILE CO.**

457 MARKET STREET, PHONE SUTTER 1687.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

CONCRETE MIXERS
- Chicago Improved Cube Mixer. Pacific Coast Offices, 338 Brannan St., S. F., and F. T. Crowe & Co.....Portland and Seattle.
- Foote Mixers sold by Langford, Bacon & Myers.....215 Rialto Bldg., S. F.
- Ransome Mixers, sold by Norman B. Livermore & Co....Metropolis Bank Bldg., S. F.
- Planetary Mixers, manufactured by Enterprise Foundry Co...200 Second St., S. F.

CONCRETE PILES
- Harron, Rickard & McCone. Townsend Street, San Francisco.
- Portland Concrete Pile & Equipment Co., Phelan Bldg., S. F.

CONCRETE POURING APPARATUS
- Concrete Appliances Co., Los Angeles; Parrott & Co., Coast Representatives, San Francisco, Portland, Seattle.

CONCRETE REINFORCEMENT
- United States Steel Products Co., San Francisco, Los Angeles, Portland and Seattle
- Clinton Fireproofing System, L. A. Norris, Monadnock Bldg., S. F.
- International Fabric & Cable, represented by Western Builders' Supply Co., 680 Mission St., S. F.
- Plain and Twisted Bars, sold by Baker & Hamilton, San Francisco, Los Angeles and Sacramento.
- Triangle Mesh Fabric, Sales Agents, The Lilley & Thurston Co....Rialto Bldg., S. F.
- Twisted Bars, sold by Woods & Huddart, 444 Market St., S. F.

CONCRETE SURFACING
- "Alkacene" Liquid Concrete, Boyd & Moore, 356 Market St., S. F.
- Colak Concrete Paint, manufactured by Pacific Colak Paint Co., Merchants National Bank Bldg., S. F.
- "Biturine," sold by Biturine Co. of America, 24 California St., S. F.
- The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
- Buswell's Steel and Concrete Paints. Oakland, Cal.
- "Concreta," sold by W. P. Fuller & Co., S. F.
- Glidden Liquid Cement, manufactured by Glidden Varnish Company, Whittier, Coburn Co., San Francisco and Los Angeles, Pacific Coast Distributors.
- WESCO—West Coast Kalsomine Co., 110 Hansford Bldg., S. F.

CONSTRUCTION MATERIAL
- Electric Appliance Co., 807 Mission St., S. F.

CONTRACTORS, GENERAL
- Commary-Peterson Co., Inc., 46 Kearny St., S. F.
- Elam, Thos. & Son, Builders' Exchange, S. F.
- Esterly Construction Co.....Berkeley, Cal.
- F. O. Engstrum Co., East Fifth and Seaton Sts., Los Angeles.
- Foster, Vogt Co.,....722 Hearst Bldg., S. F.
- Geo. H. Stoffels & Co., 830 Pacific Bldg., S. F.
- Geo. W. Boxton.....Hearst Bldg., S. F.
- Hansen, F. L., 525 Monadnock Bldg., S. F.
- Holm & Son.....Foxcroft Bldg., S. F.
- Harvey A. Klyce.. ..Monadnock Bldg., S. F.
- McLaren & Peterson, 706-707 Williams Bldg., S. F.
- C. P. Moore Building Co., Monadnock Bldg., S. F.
- Locke Construction Company, Crocker Bldg., S. F.
- Northern Construction Co., Mills Bldg., S. F.
- William H. Henning..Examiner Bldg., S. F.
- Ransome Concrete Co., 1218 Broad'y, Oakland
- Rickon-Ehrhart Eng. & Const. Co., 1859 Geary St., S. F.
- Rohert Trost...26th and Howard Sts., S. F.
- Peterson & Wilson.....1113 Post St., S. F.
- Wm. Bateman.....1915 Bryant St., S. F.
- Van Sant-Houghton Co., 503 Market St., S. F.
- Williams Bros. & Henderson, 351 Monadnock Bldg., S. F.
- The J. M. White Bros....101 Post St., S. F.

CORNER BEAD
- "Prescott," sold by Boyd & Moore, 356 Market St., S. F.
- Union Metal Corner Company, 144 Pearl St., Boston, represented on the Pacific Coast by Waterhouse & Price.

CRUSHED ROCK
- Niles Rock, sold by California Building Material Company.....Pacific Bldg., S. F.
- Niles Sand, Gravel & Rock Co., Mutual Savings Bank Bldg., S. F.

CORK TILING
- Nonpareil Cork Tiling, David E. Kennedy, Inc., N. Y. Pacific Coast office, Phelan Building, S. F.. G. H. Freear, Mgr.

DAMP-PROOFING COMPOUND
- The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
- Biturine Co. of America, 24 California St., S. F.
- Glidden's Liquid Rubber, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.

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COLUMBIA MARBLE COMPANY

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SANITARY FLOORING, WAINSCOT AND BASE. Laid Exclusively by
FIBRESTONE & ROOFING CO., 704 Market St. San Francisco Tel. Sutter 329

ARCHITECTS' SPECIFICATION INDEX—*Continued*

DAMP-PROOFING COMPOUND—Continued.
"Hydrex" Felt & Compound, manufactured by Hydrex Felt & Engineering Co., New York, sold by Rolph, Mills & Co., Metropolis Bank Bldg., S. F.
Lithoid Product Company, Merchants Exchange Bldg., S. F.
Colak Concrete Paint, manufactured by Pacific Colak Paint Co., Merchants National Bank Bldg., S. F.
"Pabco" Damp Proofing Compound, sold by Paraffine Paint Co.....34 First St., S. F.
Parrott & Co., agents for Genasco Positive Seal Damp Proof Paint.
"Protectorine," Compound, sold by Boyd & Moore.....356 Market St., S. F.
H. D. Samuel Co....Monadnock Bldg., S. F.
WESCO—West Coast Kalsomine Co., 110 Hansford Bldg., S. F.

DOOR HANGERS
Pitcher Hanger, sold by Pacific Tank Company.....231 Berry St., S. F.
Reliance Hanger, sold by Sartorius Co., S. F.; D. F. Fryer & Co., Louis R. Bedell, Los Angeles, and Portland Wire & Iron Works.

DOOR OPENER
Carlson Door Opener and Closer, 1622A Howard St., S. F.

DOORS—DISAPPEARING
Pacific Tank & Pipe Co.,231 Berry St., S. F.

DOORS AND SHUTTERS
Kinnear Steel Rolling Doors and Shutters, Lilley & Thurston Co., Rialto Bldg., S. F.
"Cross" Horizontal Folding Doors, Boyd & Moore, Agents.....356 Market St., S. F.

DUMB WAITERS
Energy Dumb Waiters, Boyd & Moore, Agents.....356 Market St., S. F.
Wells & Spencer Machine Company, 173 Beale St., S. F.

ELECTRICAL CONTRACTORS
American Electrical Engineering Co. 435 Golden Gate Ave., S. F.
Butte Engineering Co..683 Howard St., S. F.
Central Electric Co..185 Stevenson St., S. F.
Davis & Doman Electric Co., 1220 Webster St., S. F.
Electric Appliance Co., 807 Mission St., S. F.
Garden City Electrical Co.....San Jose, Cal.
Jno. G. Sutton Co.....243 Minna St., S. F.
Pacific Fire Extinguisher Company, 507 Montgomery St., S. F.

ELEVATORS
Otis Elevator Company, Stockton and North Point, S. F.
Van Emon Elevator Co..54 Natoma St., S. F.
Wells & Spencer Machine Co., 173 Beale St., S. F.

ELEVATOR DOORS
"Cross" Elevator Doors, Boyd & Moore, Inc., Agents.....356 Market St., S. F.
Dahlstrom Metallic Door Co., Rialto Bldg., S. F.

ELEVATORS, SIGNALS, FLASHLIGHTS AND DIAL INDICATORS
Elevator Supply & Repair Co., 593 Market St., S. F.

ENGINEERS
F. J. Amweg.....700 Marston Bldg., S. F.
W. W. Breite.....Clunie Bldg., S. F.
J. C. Hurley..... 12 Geary Street, S. F.
Hunter & Hudson, Monadnock Bldg., S. F.
Rickon-Ehrhart Co., 1859 Geary St., S. F.
Van Sant-Houghton Co., 503 Market St., S. F.

EXPRESS CALL SYSTEM
Elevator Supply & Repair Co., 593 Market St., S. F.

FIRE ESCAPES
Pacific Structural Iron Works, Structural Iron and Steel, Fire Escapes, etc. Phone Market 1374; Home, J 3435..370-84 Tenth St., S. F.
H. Johns-Manville Company, Branches in all Principal Coast Cities.

FIRE EXTINGUISHERS
Pacific Fire Extinguisher Co., 507 Montgomery St., S. F.

FIREPLACE DAMPER
Head, Throat and Damper for open fireplaces, Colonial Fireplace Co., Chicago. (See advertisement for Coast agencies.)

FIREPROOFING AND PARTITIONS
Gladding, McBean & Company, Crocker Bldg., S. F.
Los Angeles Pressed Brick Co., Frost Bldg., L. A.
Roebling Construction Co., Crocker Bldg., S. F.
"Bestwall," manufactured by California Bestwall Co., Lilley & Thurston Co., distributors, Rialto Bldg., S. F.
Collins Metal Lath and Steel Studding, sold by Parrott & Co., S. F. and Los Angeles

FIREPROOF PARTITIONS
Rabbitt Partition Co., 34 Ellis St., S. F.

FIXTURES—BANK, OFFICE, STORE, ETC.
Burlingame Cabinet Works, 509-511 Sixth Street, San Francisco
A. J. Forbes & Son..1530 Filbert St., S. F.
Fink & Schindler.....218 13th St., S. F.
T. H. Meek Company..1157 Mission St., S. F.
C. F. Weber & Co., 365 Market St., San Francisco and 210 N. Main St., Los Angeles, Cal.

FLOOR TILING
Watson Mantel & Tile Co., 457 Market St., S. F.

FLOOR VARNISH
Bass-Hueter and S. F. Pioneer Varnish Works, 816 Mission St., S. F.
R. N. Nason & Co...151 Potrero Ave., S. F.
Standard Varnish Works, Chicago, New York and S. F.
Worden-Meeker Varnish Works, S. F. and Oakland

FLOORS—CORK
Nonpariel Cork Tiling, David E. Kennedy, Inc., N. Y. Distributor for the Pacific Coast, G. H. Freear, Phelan Building, S. F.

FLOORING—MAGNESITE
Fibreston & Roofing Co., 704 Market St., S.F.
Mallott & Peterson, 682 Monadnock Bldg., S. F.

GAS PLATE CABINETS
Modern Cabinet Company, 1217 Divisadero St., S. F.
Pacific Hardware & Steel Co., San Francisco, Los Angeles and Portland.
A. W. Pike.....711 Mission St., S. F.

GARAGE EQUIPMENT
Bowser Gasoline Tanks and Outfit, Bowser & Co. .....612 Howard St., S. F.

GARBAGE BURNERS
Water Heating Garbage Burners, sold by Cal. Hydraulic Eng. & Supply Co., 70 Fremont St., S. F.

GARBAGE CHUTE
Bill & Jacobsen.....524 Pine St., S. F.

WELLS AND SPENCER MACHINE CO.
F. M. SPENCER, SUCCESSOR
173-177 BEALE ST., SAN FRANCISCO
REPRESENTING
WESTERN ELEVATOR COMPANY
REPAIRS, INSPECTIONS AND DUMB WAITERS
TELEPHONES: KEARNY 684
HOME J 1124

ARCHITECTS' SPECIFICATION INDEX—*Continued*

GLASS AND GLAZING
W. P. Fuller & Co.,
San Francisco, Los Angeles and Portland.

GRAPHITE
Detroit Grapbite Co..301 Hearst St., S. F.

GRAVEL, SAND AND CRUSHED ROCK
Bay Development Co.....153 Berry St., S. F.
California Building Material Co.,
Pacific Bldg., S. F.
Del Monte White Sand, sold by Pacific Improvement Co.....Crocker Bldg., S. F.
Grant Gravel Co.....87 Third St., S. F.
Niles Sand, Rock & Gravel Co.,
Mutual Bank Bldg., S. F.

HARD WALL PLASTER
Empire Hard Wall Plaster, sold by Pacific-Portland Cement Co., Pacific Bldg., S. F.
Reno Hard Wall Plaster, sold by Western Building Material Co.,
430 California St., S. F.

HARDWARE
Brittain & Co....San Francisco and Oakland.
Russwin Hardware, Joost Bros., S. F.

HARDWOOD FLOORING
Boyd & Moore.....356 Market St., S. F.
Dieckmann Hardwood Co.,
Beech St., cor. Taylor, S. F.
Strable Mfg. Co.....Oakland, Cal.
New York Hardwood Floor Co.,
784 O'Farrell St., S. F.
Parrott & Co.....320 California St., S. F.
White Bros., Cor. Fifth and Brannan Sts., S. F.
Hardwood Interior Co., 554 Bryant St., S. F.

HARDWOOD LUMBER
Dieckmann Hardwood Co.,
Beach St., cor. Taylor, S. F.
Parrott & Co.....320 California St., S. F.
Strable Mfg. Co.,
First St., betw. Washington & Clay, Oakland.
White Bros., Cor. Fifth and Brannan Sts., S. F.

HEATERS—AUTOMATIC
Hoffman Heater, sold by Holbrook, Merrill & Stetson, San Francisco and Los Angeles.
Humphrey Co.,
565 N. Rose St., Kalamazoo, Mich.
Pittsburg Water Heater, sold by Thos. Thieben & Co. .....667 Mission St., S. F.

HEATING ENGINEERS
General Engineering Co.,
231-3-5 Natoma St., S. F.

HEATING EQUIPMENT—VACUUM, ETC.
C. A. Dunham Co., Marshalltown, Iowa, Western Division Office,
Monadnock Bldg., S. F.
Guernsey & Wheeler, ...Rialto Bldg., S. F.

HEATING AND VENTILATING
Atlas Heating & Ventilating Co.,
Fourth and Freelon Sts., San Francisco.
Fess System Co.....220 Natoma St., S. F.
Guernsey & Wheeler....Rialto Bldg., S. F.
Gilley-Schmid Co., Inc.,
Thirteenth and Mission Sts., S. F.
General Engineering Company,
281 Natoma St., S. F.
Hoffman & Meusser,
1129-1131 Howard St., San Francisco.
J. C. Hurley..... 12 Geary Street, S. F.
S. T. Johnson Co.....1334 Mission St., S. F.
Mangrum & Otter, Inc., 507 Mission St., S. F.
Jno. G. Sutton Co....243 Minna St., S. F.
Pacific Blower & Heating Co.,
17th St., betw. Mission and Valencia, S. F.
Pacific Fire Extinguisher Company,
507 Montgomery St., S. F.
Petersen-James Co....710 Larkin St., S. F.

HINGES
Stanley's Ball-Bearing Hinges, Stanley Co.,
New Britain, Conn.

HOTELS
The Angelus, Loomis Bros.....Los Angeles

ILLUMINATION
Great Western Power Company,
233 Post St., S. F.

INGOT IRON
American Rolling Mill Co., Middleton, Ohio.
California Corrugated Culvert Co.,
5th and Parker Sts., West Berkeley.

INLAID FLOORS
Hardwood Interior Co., 554 Bryant St., S. F.

INTERIOR WOODWORK
New York Hardwood Floor Co.,
784 O'Farrell St., S. F.

INTERIOR WALL FINISH
Satina mfg'd. by C. H. Brown Paint Co.,
F. A. Frisius, 341 Lincoln ave., Alameda, California.

INSPECTIONS AND TESTS
R. E. Noble & Co., Humboldt Bank Bldg., S. F.
Robert W. Hunt & Co.,
418 Montgomery St., S. F.
Smith, Emery & Co. Inc.,
651 Howard St., S. F.

INSULATING MATERIALS
Armstrong Cork Co..... Pittsburg, Pa.

INTERIOR DECORATING
The Tozer Company, 228 Grant Ave., S. F.

JOIST HANGERS
Western Builders' Supply Co.,
680 Mission St., S. F.

LANDSCAPE ENGINEERS
MacRorie & McLaren Co.,
Westbank Bldg., S. F.

LIME
Holmes Lime Company,
Monadnock Bldg., S. F.
Shasta Lime Products Company,
1550 Bryant St., S. F.

LIGHTING FIXTURES
Adams & Hollopeter....745 Mission St., S. F.
Bauer Fixture Co.....49-55 Jones St., S. F.

LIGHT, HEAT AND POWER
Pacific Gas & Elec. Co..445 Sutter St., S. F.
Great Western Power Co.,
233 Post Street, San Francisco

LOCKERS—METAL
Hart & Cooley Co., Boyd & Moore, Agents,
356 Market St., S. F.

LUMBER
Sunset Lumber So.....Oakland, Cal.
Santa Fe Lumber Co.,
Seventeenth and De Haro Sts., S. F.

MANTELS
Mangrum & Otter ....561 Mission St., S. F.
S. Ginsberg & Co.....1029 Larkin St., S. F.
Watson Mantel & Tile Co.,
457 Market St., S. F.
Thos. F. Rigney, ...9 City Hall Ave., S. F.

MARBLE
Columbia Marble Co...268 Market St., S. F.

METAL AND STEEL LATH
Baker & Hamilton, 433 Brannan St., S. F.
Roebling Construction Co.,
Crocker Bldg., S. F.
L. A. Norris & Co., Monadnock Bldg., S. F.

METAL CEILINGS
Berger Mnfg. Co....1120 Mission St., S. F.
San Francisco Metal Stamping & Corrugating Co.....Treat Ave. and 19th St., S. F.

METAL DOORS AND WINDOWS
Capitol Sheet Metal Works,
1927 Market St., S. F.
Dahlstrom Metallic Door Co., Western office,
Rialto Bldg., S. F.
S. Ginsberg & Co., 1029 Larkin St., S. F.
Rulofson Metal Window Works,
Eighth and Brannan Sts., San Francisco.
Fink & Schindler Co., 218 13th St., S. F.

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METAL SHINGLES
Meurer Bros., J. A. McDonald, Pacific Coast Agent.... Third, near Townsend St., S. F.
San Francisco Metal Stamping & Corrugating Co.....Treat Ave. and 19th St., S. F.
L. B. Hooker Co., 1530 Howard St., S. F.

MIXERS
Enterprise Foundry Co., 200 2d St., S. F.

OIL BURNERS
S. T. Johnson Co...1334 Mission St., S. F.
Fess System Co.....220 Natoma St., S. F.
T. P. Jarvis Crude Oil Burner Co., 275 Connecticut St., S. F.

OFFICE FURNITURE
Modern Cabinet Company, 1217 Divisadero St., S. F.

OPERA CHAIRS
C. F. Weber & Co....365 Market St., S. F.

ORNAMENTAL IRON AND BRONZE
J. G. Braun.....Chicago and New York
California Artistic Metal and Wire Company, San Francisco.
Ralston Iron Works, 20th and Indiana Sts., S. F.
Standard Company, represented by Mailler Searles.....817 Monadnock Bldg., S. F.
Standard Iron Works, 235-39 Shipley St., S. F.
Golden Gate Structural & Ornamental Iron Works .....1479 Mission St., S. F.
C. J. Hillard Company, Inc., 211-215 8th St., S. F.
West Coast Wire & Iron Works, 861-863 Howard St., S. F.

OVENS—BREAD AND PASTRY
New Era Oven Co., 2560 Sutter St., S. F.

PAINT FOR STEEL STRUCTURES
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
"Biturine," sold by Biturine Co. of America, 24 California St., S. F.
Buswell's Steel and Concrete Paints, Oakland, Cal.
Detroit Superior Graphite Paint, manufactured by Detroit Graphite Company. C. W. Pike Company, Coast Sales Agents, 22 Battery St., S. F.
Glidden's Acid Proof Coating, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.

PAINT FOR CEMENT
Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. (Inc.), [See adv. in this issue for Pacific Coast agents.]
"Biturine," sold by Biturine Co. of America, 24 California St., S. F.
Glidden's Liquid Cement, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.
The American Bitumastic Enamels Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
Vitrolite Cold Water Paint, sold by Boyd & Moore.....356 Market St., S. F.

PAINTS, OILS, ETC.
Bass-Hueter Paint Company, Mission, near Fourth St., S. F.

PAINTS, OILS, ETC., Continued
R. N. Nason Company.....San Francisco
"Biturine," sold by Biturine Co. of America, 24 California St., S. F.
Glidden Varnish Co., Cleveland, Ohio, represented by Whittier-Coburn Co., S. F. and Los Angeles
Paraffine Paint Co....38-40 First St., S. F.
Standard Varnish Works, represented by W. P. Fuller & Co., S. F. and Los Angeles.
Wesco—West Coast Kalsomine Co., 110 Hansford Bldg., S. F.
Worden-Meeker Varnish Co., S. F. & Oakland.

PAINT PRODUCTS
Felix Gross Co.,.....440 Ninth St., S. F.

PAVING BRICK
Vallejo Brick & Tile Co., Alaska Commercial Bldg., S. F.

PHOTO ENGRAVING
California Photo Engraving Co., 121 Second St., S. F.

PHOTOGRAPHY
Arthur J. Brunner Co.,..47 Kearny St., S. F.
Gabriel Moulin.....153 Kearny St., S. F.
Walter Scott.....558 Market St., S. F.

PIPE—CORRUGATED INGOT IRON
California Corrugated Culvert Company, Los Angeles and West Berkeley.

PIPE—VITRIFIED SALT GLAZED TERRA COTTA.
N. Clark & Sons, 112 Natoma St., San Francisco
Gladding McBean & Co., Crocker Bldg., S. F.
Pacific Sewer Pipe Company, I. W. Hellman Bldg., Los Angeles
Steiger Terra Cotta and Pottery Works, Mills Bldg., S. F.

PLASTER
Empire Plaster, The Nevada Gypsum Co., Pacific Bldg., S. F.
Mound House Plaster Co., 259 Monadnock Bldg., S. F.

PLASTERING CONTRACTORS
Geo. MacGruer....319 Mississippi St., S. F.

PLUMBING
J. E. O'Mara. .....443 Minna St., S. F.
Jno. G. Sutton Co.....243 Minna St., S. F.
Peterson-James Co.....710 Larkin St., S. F.
Wetzel & Grass,.....105 Fulton St., S. F.
Wittman, Lyman & Co., 315 Polk St., S. F.
Coleman, Alex., 706 Ellis St., S. F.

PLUMBING FIXTURES, MATERIALS, ETC.
Crane Co....Second and Brannan Sts., S. F.
Jno. Douglas Co....571 Mission St., S. F.
Haines, Jones & Cadbury Co., 851-859 Folsom St., S. F.
P. F. Howard Co., Second and Folsom Sts., S. F.
Louis Lipp Company, Winton Place, Ohio. Pacific Coast Office, 693 Mission St., S. F.
Mark-Lally Co..First and Folsom Sts., S. F.
J. L. Mott Iron Works, D. H. Gulick, selling agent .....135 Kearny St., S. F.

PLUMBERS' SUNDRIES
Orca Sanitary Toilet Seat, manufactured by Orca Mfg. Co., 700 Hooker & Lent Bldg., S. F.

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Steiger Terra Cotta and Pottery Works, Mills Bldg., S. F.

PULLEYS, SHAFTING, GEARS, ETC.
Meese and Gottfried Company.....San Francisco, Seattle, Portland and Los Angeles

PUTTY
P. F. Virgin Co.....713 Brannan St., S. F.

RAILROADS
Southern Pacific Co.....Flood Bldg., S. F.
Western Pacific Railroad..Mills Bldg., S. F.

ROAD MACHINERY
Iroquois Iron Works (Barber Asphalt Company) .....Head Bldg., S. F.

REFRIGERATORS
McCray Refrigerators, sold by Nathan Dohrmann Co., Geary and Stockton, Sts., S. F.

ROLLING DOORS, SHUTTERS, PARTITIONS, ETC.
Lilley & Thurston Co., Rialto Bldg., S. F.
C. F. Weber & Co.....365 Market St., S. F.

ROOFING AND ROOFING MATERIALS
Biturine Co. of America, 24 California St., S. F.
J-M Asbestos Roofing, sold by H. W. Johns-Manville Co., Agencies in all the principal West Coast cities.
F. W. Bird & Son, East Walpole, Mass., Coast Agents, Lilley & Thurston Co., Rialto Bldg., S. F.
Mallott & Peterson, 682 Monadnock Bldg., S. F.
Marsh Brothers .....Call Bldg., S. F.
Meurer Bros. Co.....630 Third St., S. F.
L. B. Hooker Co...1530 Howard St., S. F.
"Ferroinclave," the Brown Hoisting Machinery Co., Coast Agent, Chas. A. Levy, Monadnock Bldg., S. F.
Fibrestone & Roofing Co., Mutual Savings Bank Bldg., S. F.
Genasco Ready Roofing, sold by Parrott & Co.....320 California St., S. F.
Hydrex Felt and Compound, sold by Rolph, Mills & Co., Western Metropolis Bank Bldg., S. F.
Mackenzie Roof Co., 425 15th St., Oakland.
Meurer Bros. Co., A. H. McDonald, Coast Representative.....630 Third St., S. F.
H. D. Samuel Company, 1054 Monadnock Bldg., S. F.
United Materials Co.... Balboa Bldg., S. F.

ROOFING TIN
N. & G. Taylor Co.....Philadelphia, Pa.
J. A. Drummond, 422 Chronicle Bldg., S. F.

RUBBER TILING AND MATTING
New York Belting & Packing Co., 129 First St., S. F.

SAFES
Howe Scale Company, 333 Market St., S. F.

SAND
Del Monte White Sand, sold by Pacific Improvement Company, Crocker Bldg., S. F.
Niles Sand, Gravel and Rock Co., Mutual Bank Building, S. F.

SANDSTONE BRICK
Sacramento Sandstone Brick Co., 39 Stevenson St., S. F.

SASH CORD
Puritan Sash Cord Company. (For Coast Agents, see advertisement.
Samson Cordage Works, Manufacturers of Solid Braided Cords and Cotton Twines 88 Broad St., Boston, Mass.
Silver Lake A Sash Cord, represented by Sanford Plummer, 149 New Montgomery St., S. F.

SCENIC PAINTING—DROP CURTAINS, ETC.
The Edwin H. Flagg Scenic Company, 1638 Long Beach Ave., Los Angeles.

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C. F. Weber & Co....365 Market St., S. F.
512 S. Broadway, Los Angeles.

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"Hydrex" Waterproof Building Papers, "Hydrex" "Saniflor" Deafening Felt, manufactured by Hydrex Felt & Eng. Co., N. Y. and sold by Rolph, Mills & Co., Metropolis Bank Bldg., S. F.
Neponset Waterproof Building Papers, Neponset Florian Sound Deadening Felt, manufactured by F. W. Bird & Son, East Walpole. Mass.. Coast Agents, Lilley & Thurston Co.....Rialto Bldg., S. F.
Samuel Cabot Mfg. Co., Boston Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

SHEET METAL WORK
Berger Mfg. Co.....1120 Mission St., S. F.
Capitol Sheet Metal Works, 1927 Market St., S. F.
Dunlevy & Gettle....79 City Hall Ave., S. F.
Hibernia Sheet Metal Works, 219 Seventh St., S. F.
L. B. Hooker Co., 1530 Howard St., S. F.

SHEET COPPER
C. G. Hussey & Co....565 Folsom St., S. F.

SHINGLE STAINS
Cabot's Creosote Stains, sold by Waterhouse & Price, San Francisco, Los Angeles and Portland.

SKYLIGHT CORNICES, ETC.
Hibernia Sheet Metal Works, 219 Seventh St., S. F.
L. B. Hooker Co., 1530 Howard St., S. F.

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See Page 19

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Central Iron Works..621 Florida St., S. F.
Enterprise Foundry Co., 200 Second St., S. F.
Judson Manufacturing Company, 819 Folsom Street, San Francisco.
Brode Iron Works,....621 Howard St., S. F.
Mortenson Construction Co., 19th and Indiana Sts., S. F.
J. L. Mott Iron Works, D. H. Gulick, Agt., 135 Kearny St., S. F.
Pacific Rolling Mills, 17th and Mississippi Sts., S. F.
Pacific Structural Iron Works, Structural Iron and Steel, Fire Escapes, Etc. Phone Market 1374; Home, J 3435..370-84 Tenth St., S. F.
Ralston Iron Works, Twentieth and Indiana Sts., S. F.
Schrader Iron Works .....San Francisco
Union Iron Works..... San Francisco
U. S. Steel Products Company, Rialto Bldg., S. F.
Western Iron Works....141 Beale St., S. F.
Woods & Huddart ...444 Market St., S. F.

STEEL BARS FOR CONCRETE REINFORCEMENT
Baker & Hamilton, 4th and Brannan Sts., S. F.
Judson Manufacturing Company, 819 Folsom Street, San Francisco
Woods & Huddart ....444 Market St., S. F.

STEEL MOULDINGS FOR STORE FRONTS
J. G. Braun, 537 W. 35th St., N. Y., and 615 S. Paulina St., Chicago.

STEEL PROTECTIONS FOR CONCRETE
Steel Protected Concrete Co., Philadelphia, Pa.

STEEL STUDDING
Collins Steel Partition, Parrott & Co., S. F.

STORAGE SYSTEMS
S. F. Bowser & Co., 612 Howard St., S. F.

STORE FRONTS
Kawneer System, Kawneer Manufacturing Company, 420-422 Turk St., S. F.; branches in Portland, Spokane, Seattle and Los Angeles.
Hester System, sold by Western Builders' Supply Co., 680 Mission St., S. F.
Thorne Hold-Fast Metal Store Front Construction, Boyd & Moore, Inc., Agents,

SUCTION CLEANING SYSTEM
American Faucet Co., 731 Folsom St., S. F.

SURETY BONDS
Globe Indemnity Co., 508 California St., S. F.
Mass. Bonding & Insurance Co., First Nat'l Bk. Bldg., S. F.
Fidelity & Deposit Co. of Maryland, Mills Bldg., S. F.

TEMPERATURE REGULATION
Johnson Service Co., Monadnock Bldg., S. F.

TILING CORK
Nonpareil Cork Tiling, David E. Kennedy, Inc., N. Y. distributors. Pacific Coast Office, Phelan Bldg., S. F., G. H. Freear, Mgr.

TERRA COTTA CHIMNEY PIPE
Dunlevy & Gettle....79 City Hall Ave., S. F.
Gladding-McBean Co....Crocker Bldg., S. F.

TILES, MOSAICS, MANTELS, ETC.
Mangrum & Otter....561 Mission St., S. F.
Thos. F. Rigney....9 City Hall Ave., S. F.

TILE FOR ROOFING
Fibrestone & Roofing Co., Mutual Savings Bank Bldg., S. F.
Gladding, McBean & Company, Crocker Bldg., S. F.
United Materials Co.....Balboa Bldg., S. F.

TILE—WALL AND ENAMEL
S. Ginsberg & Co.....1029 Larkin St., S. F.
Watson Mantel and Tile Co., 457 Market St., S. F.

TIN PLATES
Meurer Bros. Co., A. H. McDonald, Coast Representative.....630 Third St., S. F.

VACUUM CLEANERS
American Faucet Co....731 Folsom St., S. F.
Bill & Jacobsen, ...524 Pine St., S. F.
The Vak-Klean Vacuum Cleaner, Pneulectric Co., Pacific Coast Agts., 452 Larkin St., S. F.
Sanitary Vacuum Supply Company, 1601-3 Broadway, and 1600-2 Telegraph Ave., Oakland, Cal.

VACUUM CLEANERS, Continued
Little Giant Stationary Suction Cleaner, manufactured by American Faucet Co., 731 Folsom St., S. F., and 3d and Jefferson Sts., Oakland.
The Blaisdell Machinery Co., 503 Market St., S. F.
General Engineering Company, 281 Natoma St., S. F.
"Tuec" Air Cleaner, manufactured by United Electric Co. .....Rialto Bldg., S. F.
"Rotrex" Cleaners, Guernsey & Wheeler, district managers., Rialto Bldg., S. F.

VACUUM HEATING
Van Auken System of Vacuum Heating, 15 Fremont St., S. F.

VALVES
Jenkins Bros.....30 Fremont St., S. F.

VALVE PACKING
"Palmetto Twist," sold by H. N. Cook Belting Co.....317 Howard St., S. F.

VARNISHES
S. F. Pioneer Varnish Works, 816 Mission St., S. F.

VENETIAN BLINDS, AWNINGS, ETC.
C. F. Weber & Co....365 Market St., S. F.
Ericsson Swedish Venetian Blinds, Boyd & Moore, Inc., Agents..356 Market St., S. F.

VENTILATORS AND SHEET IRON
Meurer Bros. Co., A. H. McDonald, Coast Representative.....630 Third St., S. F.

WALL BEDS
Marsball & Stearns Co., 1154 Phelan Bldg., S. F.
Murphy Bed Company....Lick Bldg., S. F.
Pacific Spring Bed Co., West Berkeley, Cal.

WALL BOARD
California Colonial Wall Board, mfrd. by Mound House Plaster Co. 259 Monadnock Bldg., S. F.

WATER HEATERS
Jos. Thieben Co., agents Pittsburg Heaters, 667 Mission St., S. F.
Hoffman Heater, sold by Holbrook, Merrill & Stetson, San Francisco and Los Angeles
Humphrey Heater, 565 N. Rose St., Kalamazoo, Mich.

WATERPROOFING FOR CONCRETE, ETC.
The American Bitumastic Enamel Company, Hill, Hubbell & Co., Pacific Coast Agents, Fife Bldg., S. F.
"Ceresit," manufactured by the Ceresit Waterproofing Co., sold by Parrott & Co., San Francisco, Los Angeles and Portland, and Julien A. Becker Co., Seattle, Wash.
Fibrestone & Roofing Co., Mutual Savings Bank Bldg., S. F.
Glidden's Concrete Floor Dressing and Liquid Cement and Liquid Cement Enamel, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
Masters Builders Co., Monadnock Bldg., S. F.
Neponset Waterdyke Felt and Compound, manufactured by F. W. Bird & Son, East Walpole, Mass., Coast Agents, Lilley & Thurston Co. .....Rialto Bldg., S. F.
Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.
The Building Material Co., Inc., 583 Monadnock Bldg., S. F.
Buswell's Steel and Concrete Paints. Oakland, Cal.

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Fink & Schindler.....218 13th St., S. F.
Mangrum & Otter....561 Mission St., S. F.
S. Ginsberg & Co.....1029 Larkin St., S. F.
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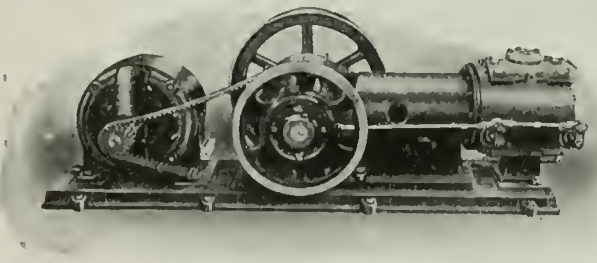

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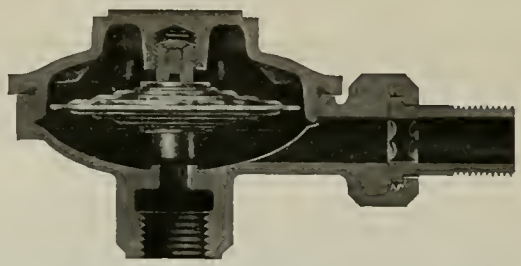

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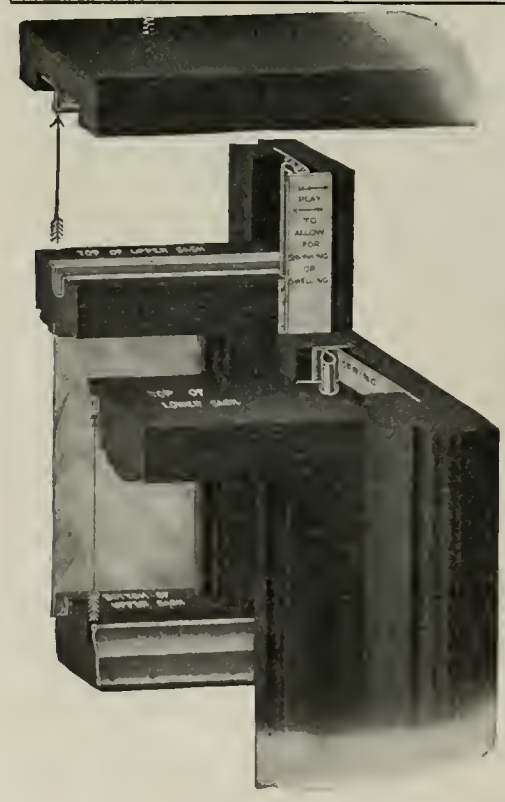

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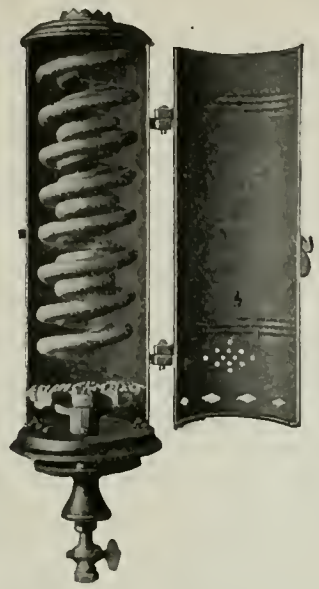

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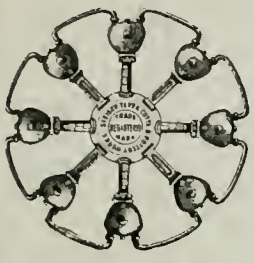

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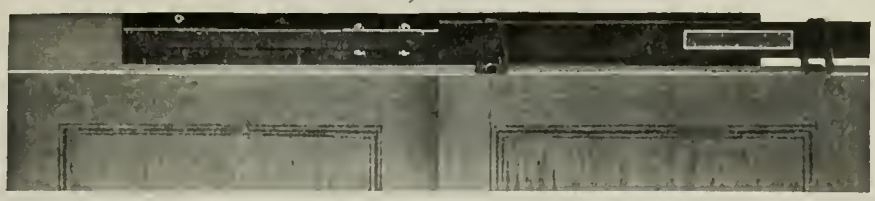

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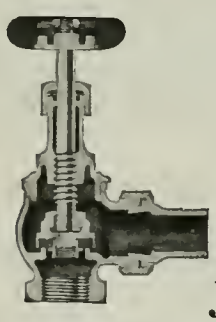

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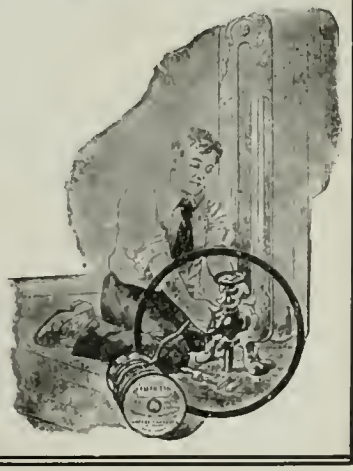

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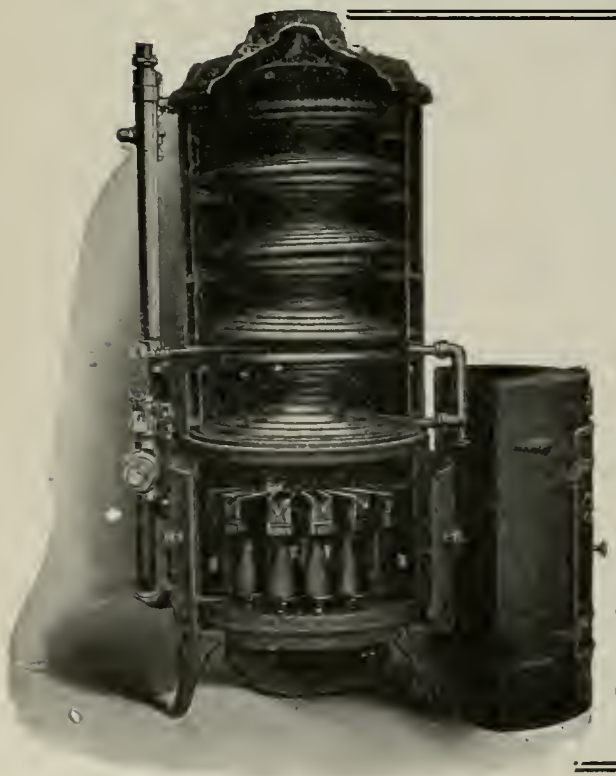

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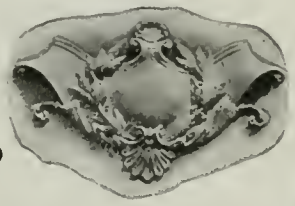

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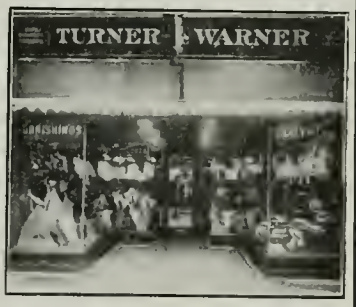

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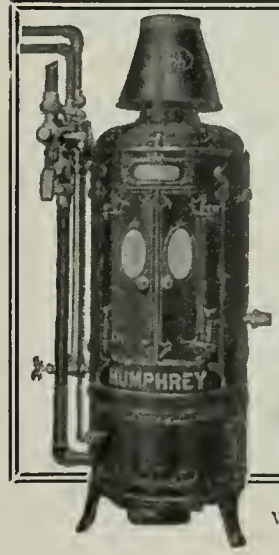

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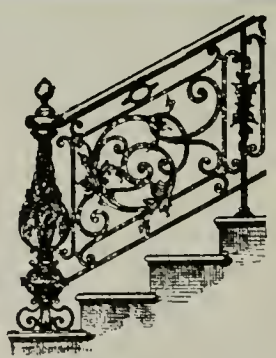

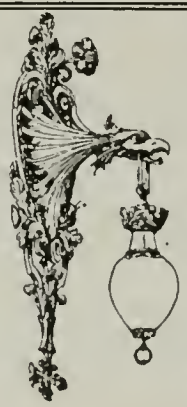

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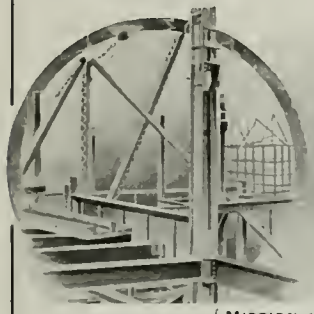

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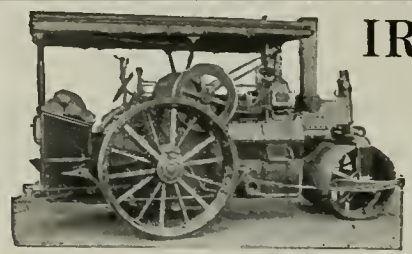

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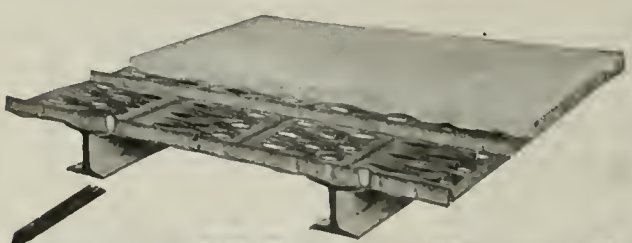

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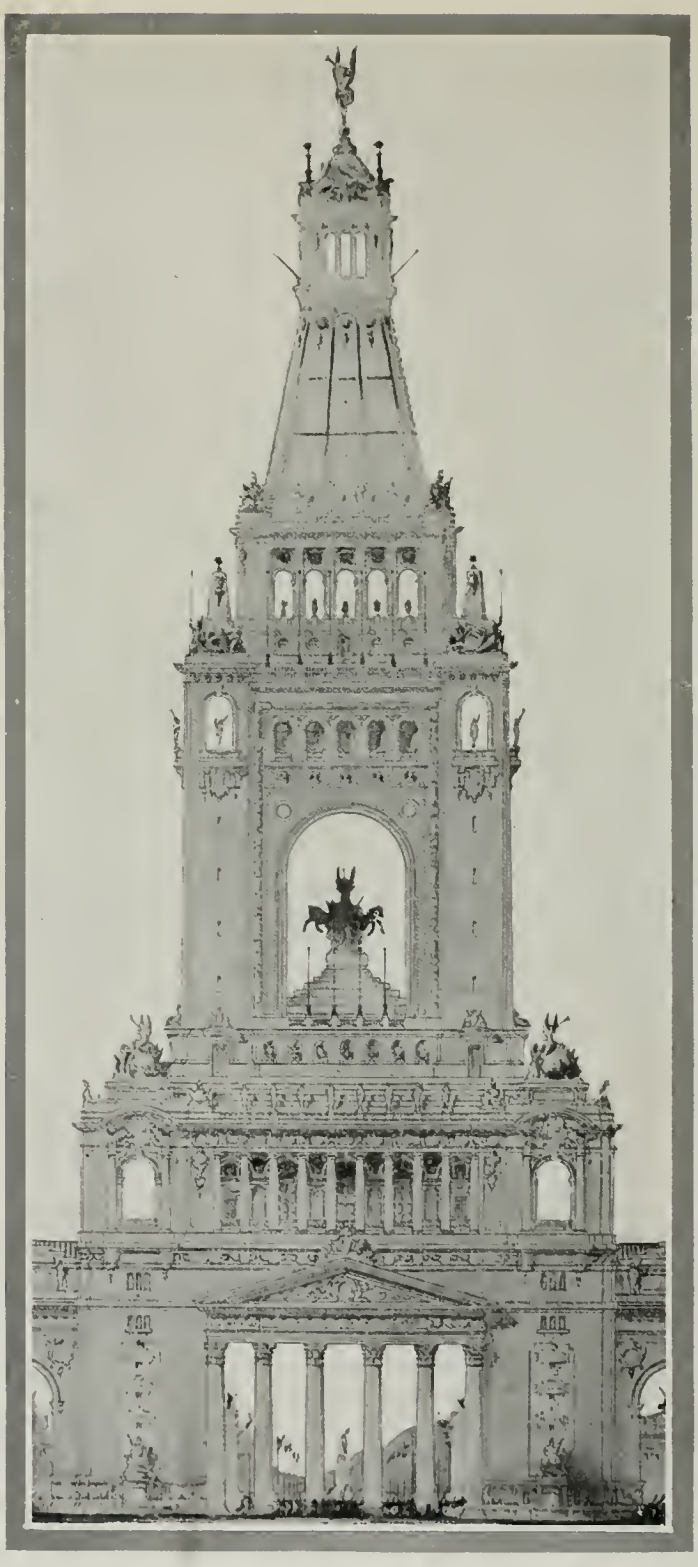


CENTRAL TOWER PANAMA-PACIFIC EXPOSITION, SAN FRANCISCO
Carrere & Hastings, Architects

Frontispiece
The Architect and Engineer of California
October, 1912

THE
Architect and Engineer
Of California
Pacific Coast States

VOL. XXX. OCTOBER, 1912. NO. 3.

Fine Arts Building, Panama-Pacific Exposition *B. R. Maybeck, Architect*

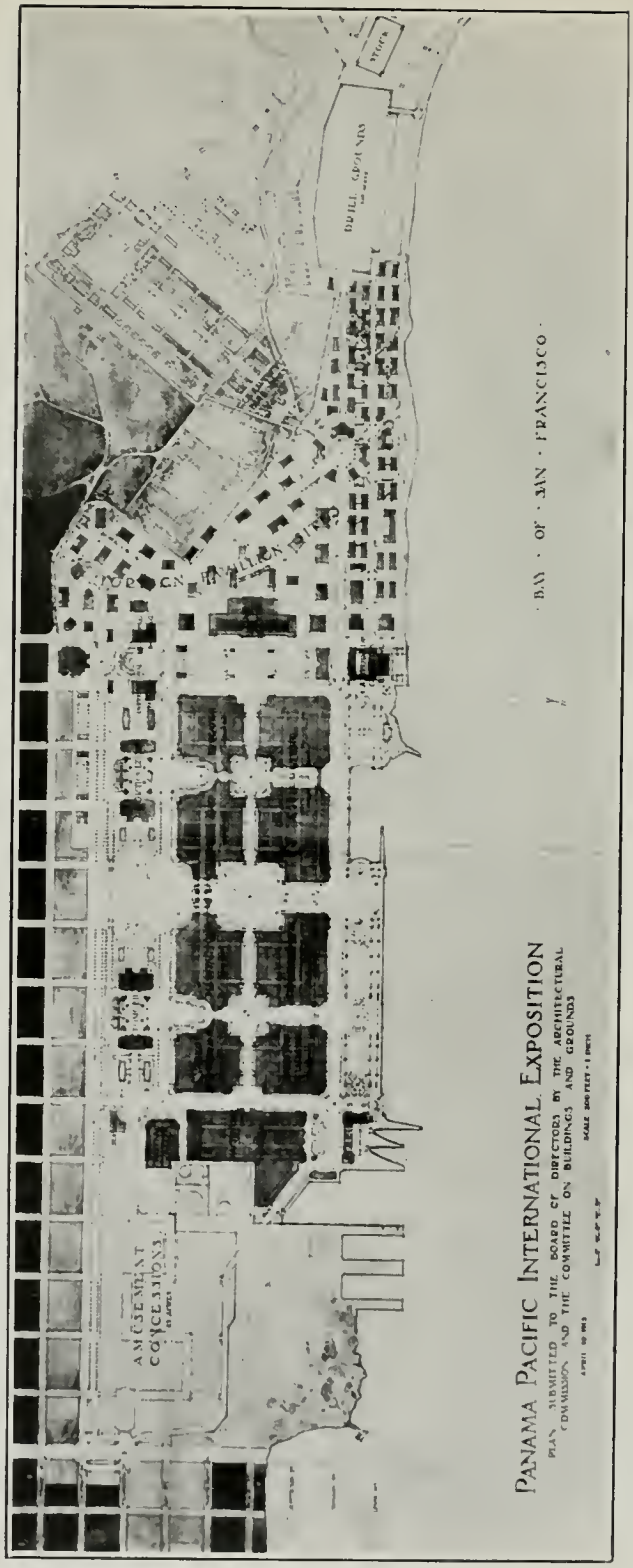
An Early Glimpse of the Panama-Pacific Exposition Architecturally*

THE Panama-Pacific International Exposition, which will be held in San Francisco in 1915 to celebrate the completion of the Panama Canal, will be ready on time. After months spent on the preliminaries, the perfected plan has been adopted by the Board of Directors and orders have been given to go ahead immediately. For the first time in the history of International Expositions, the gates will swing open on time on a completed spectacle.

The positive order is that all exhibit palaces must be complete as though ready for occupancy on June 25, 1914, which is nine months in advance of the date set for the opening, which is February 20, 1915. All contracts will be let on that basis. The first great palace to be commenced will be that devoted to machinery. The contract for this will be let on or before November 11th. From then on contracts for the other great exhibit palaces will be let at the rate of two a month, and all of these great palaces must be in course of construction inside of nine months. It is estimated that ten months is the maximum limit of time necessary to complete the most elaborate of these.

At previous expositions the largest number of workmen employed at any one time was during the days immediately preceding the opening, and in one noted instance the labor peak was not reached until after the exposition opened. In the case of the Panama-Pacific Exposition, this will be entirely different. A large number of men will be given employment within ninety days, possibly, 5,000, and this number will be gradually increased until the fall of 1913 when the work of construction will be at its very height on all buildings, and as rapidly as these are completed the number of men will become less from month to month.

*Photos by W. W. Swadley.



Building and Ground Plan, Panama-Pacific Exposition, San Francisco

The Exposition will occupy 625 acres on the northern shore of the city of San Francisco and has a water frontage of approximately two miles on the island-dotted Bay with the Marin County hills and Mt. Tamalpais in the background. Hills on three sides form a gently sloping, natural amphitheatre which has lent itself to an architectural development calling forth the best efforts of America's foremost architects. These have planned an exposition that strikes an entirely new note in architecture. Instead of planning buildings, they have arranged for six great courts, each of which, forming the walls of the buildings surrounding it, expresses the individual ideas of the architect who planned it, thereby being in complete harmony of design while entirely differentiated from all others. Standing in any one of these courts and looking northward, the visitor gets pictures of bay and mountains framed within the arches of these architectural triumphs.

While the great exhibit palaces were being designed, those entrusted with the landscaping of the grounds have not been idle. Hundreds of thousands of trees, shrubs, vines and flowers are ready to be removed at the proper time and set out in accord with a plan that will harmonize with the architectural and color scheme of the buildings. Vines will be set out on removable trellises, close alongside the exhibit palaces, so that when the support is removed they may be attached to the walls.

Already fifteen foreign governments, including France and Japan, have officially accepted the invitation of the President of the United States to participate, and thirty States and Territories have appointed commissions to select sites for State buildings. Unofficial assurances have also been received from nearly a score of other Nations that they will be represented by exhibits.

Geo. W. Kelham, chief architect of the Exposition, describes the architectural scheme of the exposition in the following entertaining manner:

In order to convey an intelligent idea of the plan, what it really represents and the men who created it, let us assume that a visitor is approaching the Exposition from Van Ness avenue.

He will pass along Chestnut street, developed into a wide boulevard, and, whether by automobile or streetcar, will arrive at the great main entrance directly opposite Devisadero street.

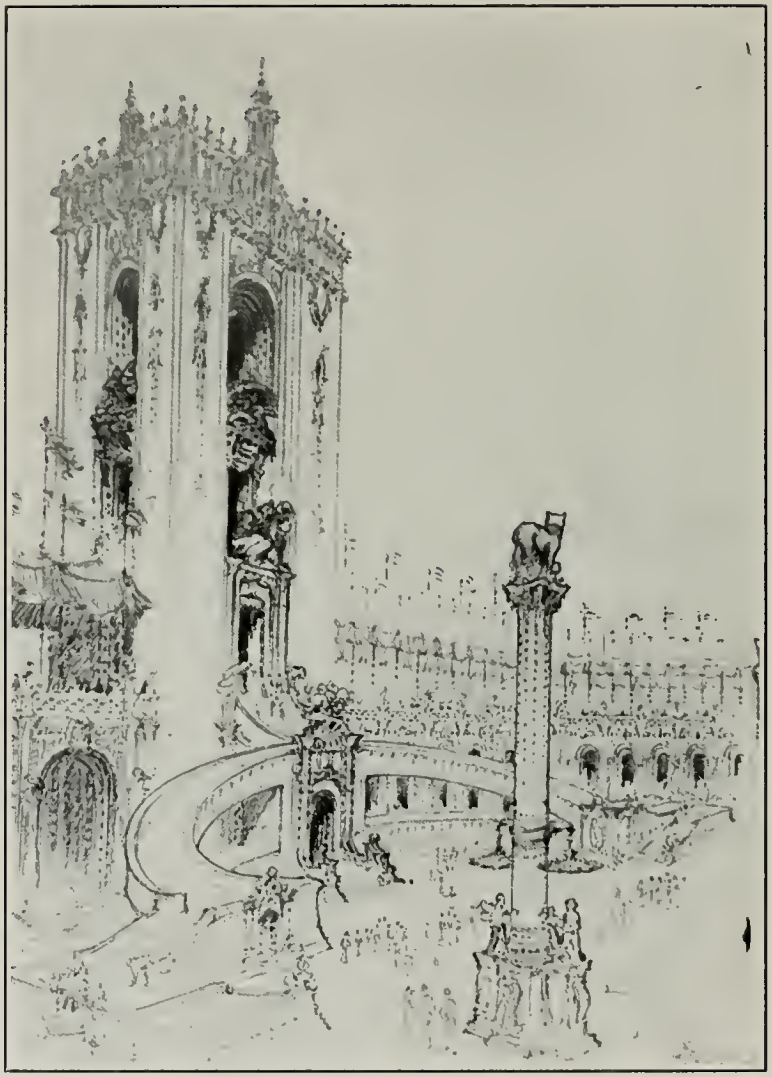
Here the Exposition should be viewed for the first time in order to receive the impression which its designers have worked to create.

Immediately upon passing through the entrance gate he will find himself in a garden approximately 3,000 feet in length. This garden will in itself constitute a great outdoor horticultural exhibition and placed in it to the right and left will be the festival hall designed by Robert Farquhar of Los Angeles and the horticultural building designed by Bakewell & Brown.

These two buildings, while entirely different in their uses and appearance, have been so skilfully designed by the architects as to produce an impression entirely harmonious. Continuing through this garden and directly in front will be the great central tower, designed by Carrere & Hastings of New York city, and directly connected with it the court of honor, designed by McKim, Mead & White of the same city. This tower will rise to a height of about 375 feet and will form the dominating feature of the Exposition.

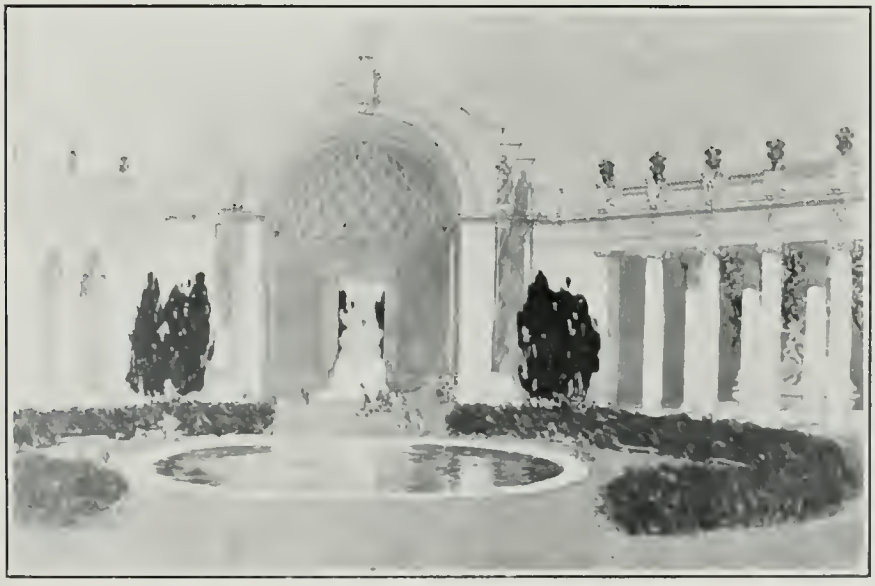
The visitor will see in front of the tower the greatest group of sculpture that will be produced on the exposition grounds, and which will probably represent the spirit of the Panama Canal and the meeting of the Atlantic with the Pacific, while in the vaulted archway of the tower itself will be grouped a series of allegorical mural paintings, forming the keynote of the color scheme of the Exposition.

Arriving in the court of honor he will find the most imposing feature of the plan. A great classic colonnade will extend entirely around this court,



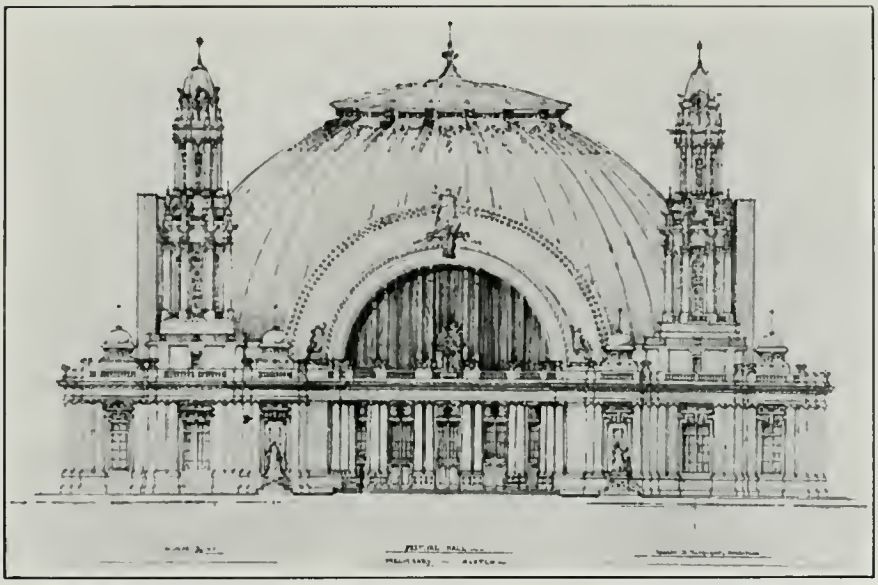
East Court, Panama-Pacific Exposition
L. C. Mullgardt, Architect

surmounted by figures designed to represent on the one side the spirit of the east and on the other the spirit of the west. There will be a sunken garden in the center, and in the continuation of this court, which will extend to the gardens on the north side, will be placed a lagoon, one of the chief water displays of the Exposition. The court of honor, in size, will correspond with the great place in front of the Cathedral of St. Peter at Rome. Continuing westward from it will be found the court of four seasons, designed by Henry Bacon of New York, and representing, with four large mural paintings, what its name implies. These paintings will be placed in great niches and screened by colonnades. Hadrian's villa, one of the old Roman palaces, is undoubtedly the inspiration for this very beautiful design. Leading directly from this court and forming the central terminating point

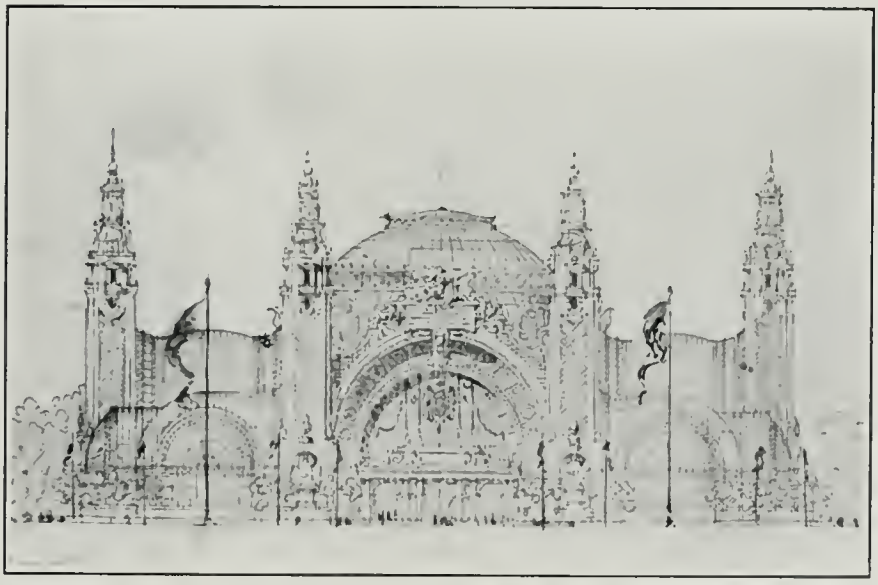


Niche in Court of Four Seasons, Panama-Pacific Exposition
Henry Bacon, Architect

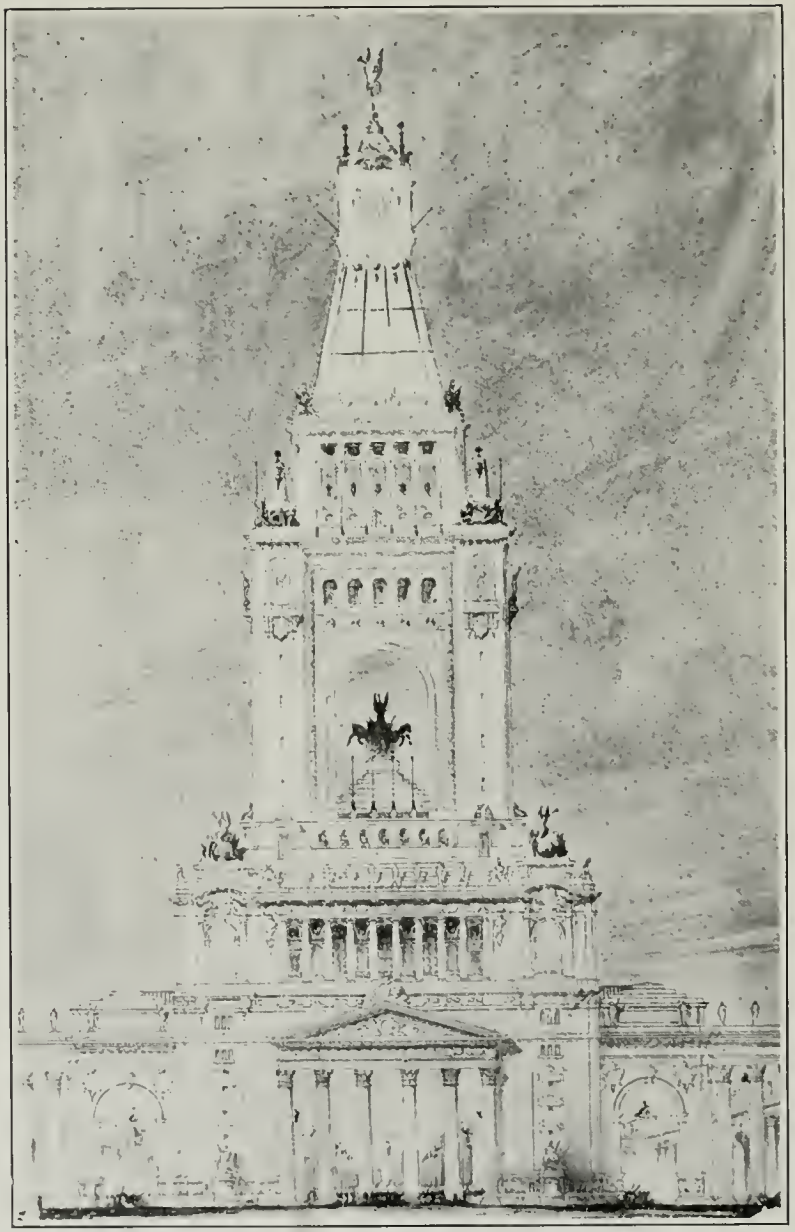
Section of Great Central Court, Panama-Pacific Exposition, San Francisco
McKim, Mead & White, Architects



Festival Hall, Panama-Pacific Exposition
Robert D. Farquhar, Architect



Horticultural Building, Panama-Pacific Exposition
Bakewell & Brown, Architects



Central Motif Main Tower *Carrere & Hastings, Architects*

of the main plan to the west will be seen the fine arts building. This building, one of the most beautiful in its architecture as well as its location, will be semi-circular in form, and will have as its central motive a low dome arising from a unique base. Forming a foreground to it will be a large lagoon surrounded on three sides by a sunken garden, all of which will be designed in a romantic and informal way.

While facing the fine arts building the visitor will see on his right the California counties building, the home of the entire state and a building of great importance and impressiveness, and back of that the great groups of foreign government and state buildings.

Continuing his trip past the California building, he will pass through the immense esplanade, which faces the bay, where will be planted the more hardy trees and shrubs, together with great lawns.

This esplanade will be of sufficient size to accommodate the immense crowds that will gather here for the naval and aquatic displays, and will extend to the extreme easterly end of the grounds. At this eastern end will be located the Ferry building, where visitors from the transbay cities may reach the Exposition. Leading directly south from this on the axis of Fillmore street will be a great avenue. Between this avenue and the court of honor, he will see a court of great interest designed by L. C. Mullgardt, similar in size to that of the four seasons. This has been carried out in a spirit of oriental architecture with a free use of color, will represent the more joyous side of the exposition life, and will be known as the festal court.

Leading directly from the court of the four seasons on one side, and the festal court on the other, are two courts which will give to the visitor an impression of having been transported into the real atmosphere of California.

These courts, which have been designed by the writer, have a southern exposure and will constitute two gardens in which will be shown all the infinite varieties of foliage which a southern country can produce, and as an object lesson of what a great outdoor California garden can be.

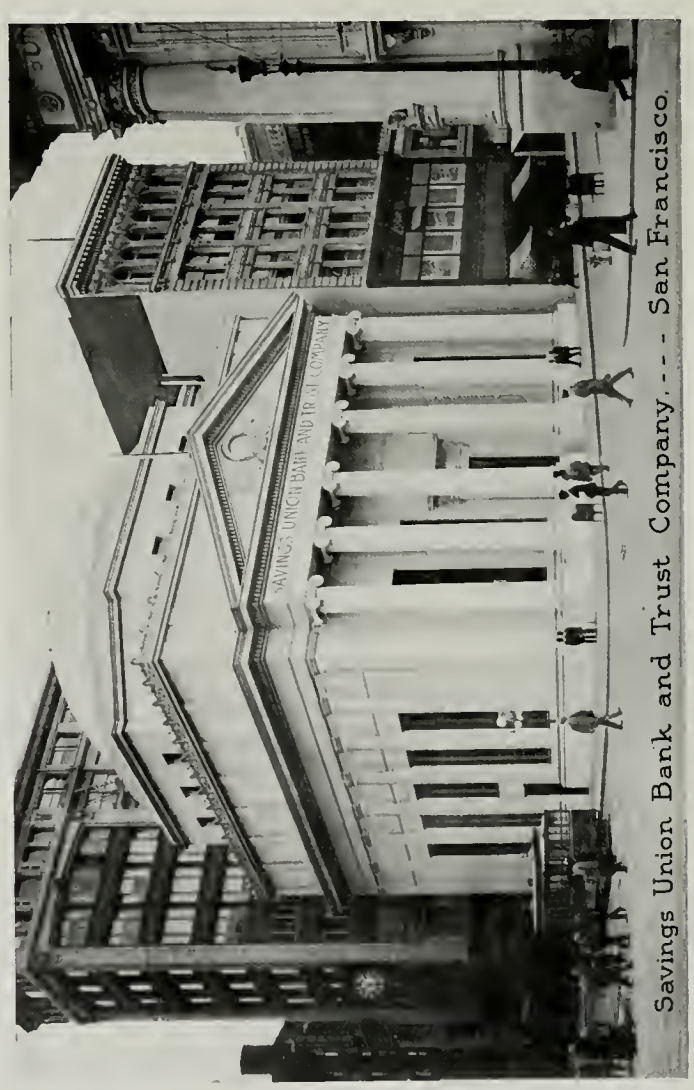
While they differ completely in treatment, the facades of both these courts have been designed in a free expression of the architecture of southern Italy, as being in the mind of the architects best fitted to harmonize with their purpose.

Continuing along this avenue the visitor will pass the largest of any of the detached buildings, the machinery building, a structure some 900 feet in length, designed by Ward Bloom in the architecture of the Spanish renaissance and forming an impressive termination for the main group of buildings on the east.

During this trip he will have seen from time to time what may be called the great outside wall of the main group of buildings which, with its many splendid entrances, pavilions and towers, will constitute one of the most interesting features of a unique plan. This part of the work has been designed by Bliss & Faville in the spirit of the early Spanish architecture of California, with its great adobe walls crowned with tiles.

This description covers only the main portion of the Exposition and does not touch on the immense areas covered by foreign governments, states and concessions.

I can only say in conclusion that the various architects connected with this work have succeeded in creating a plan which is original in the history of expositions, and a plan which will give to the visitor a constantly changing impression.



Savings Union Bank and Trust Company.--- San Francisco.

Savings Union Bank & Trust Company, San Francisco — *Bliss & Faville, Architects*

Classic Home of the Savings Union Bank and Trust Company

OF THE several splendid bank buildings that have been erected in San Francisco since the fire none has called forth greater praise for classic beauty and rich interior finish than the new home of the Savings Union Bank and Trust Company at the gore of Market and O'Farrell streets and Grant avenue. The structure is built of California granite, and the massive grey walls and dome give it a feeling of solidity and strength that one likes to find in such an institution. The building was designed by Architects Bliss & Faville for the exclusive needs of the bank.

The pediment of the structure is supported by six massive Ionic columns, thirty-eight feet high, forming the principal facade on Grant avenue. The pediment, designed by Haig Patigian, is ornamented with the head of Liberty, supported on each side by a flying eagle, after the St. Gauden's design for the new $20 gold piece. The beautifully carved caps of the columns and the sumptuous bronze doors complete the detail of the facade and catch the attention of the observing public. The bronze doors are the handsomest in the country. The four panels were designed by Arthur Mathews, and are descriptive of the historical succession of the races in the State. First, the Indian, then the Spaniard, who is typified by a Franciscan monk. Next comes the American as a miner, and, finally, an allegorical representation of the spirit of the new San Francisco shown in the ideal figure of a youth beside a potter's wheel, modeling one of the new buildings of the city.

The interior of the building is more sumptuous in detail, but simple in effect. The banking room is practically a square of seventy feet, with a height of sixty feet.

As you enter the banking room the eye is attracted by the monumental bronze candelabra, two on either side of the entrance, and the two beautiful bronze tables designed by Mathews. It is the most beautiful bronze work in the State. The room is further beautified by the introduction of eight Tavernelle marble Corinthian pilasters and columns thirty feet high, supporting the main cornice, which, like the exterior, is surmounted by an attic and a coffered ceiling. This attic is enriched with small Corinthian pilasters and panels, a central niche on each side giving necessary variety.

The screen and counter are of the same Tavernelle marble as the columns, and the small pilasters which form the screen are beautifully carved in arabesque Renaissance designs.

All of the walls not of marble are of Caen stone, giving a monotone effect of soft buff, relieved only by color in the coffers of the ceiling and in the caps of the columns and pilasters.

The directors' room is above the main banking floor and on the same floor with a series of rooms arranged for the use and convenience of the California Bankers' Association. The room itself, and all of its furnishings, were designed by Arthur Mathews. It is early Florentine in treatment. The elaborate woodwork in the room is beautifully carved in the manner of the Renaissance period; the walls are painted in a pattern of dull gray and gold, and the beam ceiling is also beautifully decorated. The electric light fixtures in carved wood represent the escutcheons of the cities in Europe where banks first had their origin. The furniture, designed after originals in an Italian palace, is also handsomely carved in medieval pattern. In fact the whole atmosphere of the room carries one back three or four centuries to a time when the Medicis and other historical families located in the large trade cities of Europe did the banking business of the world.

The safe deposit vaults and the accompanying rooms are located in the basement. The entrance to the safe deposit department is through a large

Colonnade, Savings Union Bank and Trust Company, San Francisco
Bliss & Faville, Architects

Bronze Door Panel "The Franciscan Monk"
Designed by Arthur F. Mathews

Bronze Door Panel "The Indian"
Designed by Arthur F. Mathews

Banking Room, Savings Union Bank & Trust Company, San Francisco
Bliss & Faville, Architects

Directors Room, Savings Union Bank and Trust Company, San Francisco
Bliss & Faville, Architects

Bronze Door Panel "The Spirit of San Francisco"
Designed by Arthur F. Mathews

Entrance to Safe Deposit Department,
Savings Union Bank & Trust Company
San Francisco
Bliss & Faville, Architects

Bronze Door Panel "The Miner"
Designed by Arthur F. Mathews

Banking Room, Savings Union Bank & Trust Company, San Francisco
Bliss & Faville, Architects

Reception Room, Savings Union Bank and Trust Company
Bliss & Faville, Architects

reception room, which was also decorated by Mathews. The dominant feature of the decorative scheme is the painting of St. Francis. The armor plate safe deposit vaults, the strongest in the world, are protected by the same materials and construction as our battleships, and defy attack. The lobby of the safe deposit department is done in white statuary Vermont marble, and the same simplicity of design and careful detail has been followed here as in the rest of the building.

* * *

The Correct Color Tone

THE importance of color in any scheme of decoration is paramount, says the Journal of Decorative Art of London. Bad or indifferent forms well colored may easily pass muster, but, no matter how good the designs may be, if the color is faulty, then the result is poor; but, beyond the application of color where pattern is concerned, there is an immense field where no pattern is involved, and where the problem is to color only a plain surface. It may appear to some that it is attaching too much importance to a simple thing to describe this as a problem, but if anyone thinks so he is falling into a grievous error. We have recently seen an instance of this, where an important public building is altered in its aspect entirely by a mistake of this kind. There are three divisions where the color has gone wrong. First, the staircase. This is always an important part in any place, but in the building under notice it is a feature. The woodwork is of polished pine, and age has turned it to a nice brown color. The walls have a paneled dado of the same wood, and the space between the dado and the ceiling is painted. This time it has been done a tone of blue.

This description may convey something or nothing, but the color in the actual work is a flagrant instance of hitting the wrong shade. It dulls the staircase, and makes it look somber and devoid of interest. It hangs heavy on the sense as one traverses it up and down, and yet it is not much that is required to make it a success. A little more white and a little more yellow in it, and we should have had a tone that would have softened into the woodwork and illuminated the place. So fine, in a word, is the line that separates the work from what is successful to what is a failure.

The dining room in the same building is a very fine, spacious apartment, with a pitch-pine ceiling, stained and varnished, and aged to a deep brown. A paneled dado goes some five feet up the walls, and then follows a large field of wall space that at one time has been megilped and combed, and afterwards painted and stenciled upon. Above this is a frieze some six feet deep, broken up by dwarf shafts springing from the corbels which break the frieze into long panels.

Here were the conditions: A rich brown pine roof, a framed frieze and a rich paneled pine dado.

The frieze was painted a warm olive shade of green, full in tone, and decorated with a good bold flowing scroll painted in tones of lighter and darker green inclosing a shield painted with a device. This was very well colored, and had a harmonizing effect with the ceiling. So far so good. The important feature in the room, the coloring of the walls, still had to be determined, because whatever color was placed there dominated the entire room, and made of it a success or otherwise.

Unhappily, the decorators or the committee determined upon a laky red, where a terra or orange red would have been best. The result is an unhappy conjunction which does not really harmonize with either the frieze or the dado, and, though the field was powdered with a large, open pattern, it failed to give the harmonizing quality required.

Insurance Exchange Building, San Francisco
Willis Polk & Co., Architects

Development and Increase in the Use of Asphaltum

By HARRY LARKIN,
Member of the Technical Society of the Pacific Coast.

THE use of asphaltum is in its infancy today, it occupies the same position that Portland and hydraulic cements did twenty years ago. It is a case of modern civilization "re-discovering" the virtues of the two materials, both used centuries ago, but fallen into neglect.

My personal observations have been confined to the Pacific Coast, but in that narrow field I have noted the adoption of hydraulic cement from its first use in San Francisco by Robert Mitchell, in the construction of the Howard street sewer in 1875, to its extended use in the erection of buildings and engineering enterprises today.

I do not think it would be out of place to relate the story of Mr. Mitchell's first use of cement, to illustrate the prejudice people had against material not in general use and with which they were not familiar. I want to use this to illustrate the position in my eyes in which asphaltum stands today. Mr. Mitchell had a contract to replace a small sewer in Howard street with a larger brick sewer, and it happened that the winter season during its construction was unusually wet. He had great difficulty in taking care of the water coming from the old pipe into his excavation. When he carried the water through his newly constructed brickwork, it washed out the mortar joints and necessitated the tearing out of his work for a considerable distance back in order to make the job acceptable. It happened that a shipment of Portland cement had been received from England by sailing vessel on consignment, and as there was no market for such material here at that time, the shipment was put up at auction, and Mr. Mitchell, hearing of it, bought the entire lot at his own price. After considerable persuasion on his part, the engineers permitted him to substitute Portland cement for lime mortar in the bottom courses of brick, but this permission was granted with grave doubts and was looked upon as simply humoring the fanciful notion of a contractor in difficulty. The result was most surprising both to Mr. Mitchell and the engineers, for he was able to carry the flow of water over comparatively newly constructed work in a manner never thought of. The Portland cement enabled him to complete his contract on time and in a satisfactory manner.

I might refer to the doubts existing in the minds of engineers and builders many years after that, when the late Mr. George W. Percy built the concrete arched bridge in Golden Gate Park, the Museum building at Stanford University and the stairs and galleries in the Academy of Sciences on Market street. Almost everybody looked upon it as a fad of Mr. Percy's and entertained doubts of the work's stability. Mr. Richard Keatinge, a member of our Society, has told me of the ridicule he was held up to in Palo Alto, his home town, because of his building the museum of concrete. But he now glories in the fact, for the museum stood the earthquake of 1906, while other buildings at the University did not.

Making the comparison here, it is but a few years ago that attention was given to asphaltum as a water-proofing agent, and that combinations of it with sand and gravel were used to any extent for surfacing streets and roads. It is now widely used for roofing, paving and water-proofing, and is gradually being adopted for insulation. The field for its use is unlimited, and when it is better understood, uses will be found for it that are not thought of today.

Asphaltum is in that primal state in which it offers a field for promoters, for writers of prospectuses, and for the promotion of corporations. An attempt at monopoly in asphaltum came near causing war with Venezuela during

Cleveland's administration, and a corporation is now, by virtue of some doubtful patents, collecting royalties on a combination of asphaltum, grit and rock for paving. I see no justice in such a patent, for all asphaltum pavements must be made with sand, gravel, grit and rock in the aggregate, and always have been made in that way since their first use centuries ago. The exact size of the ingredients and their proportions vary with every job and depend upon the use the pavement is to have, its location and the surrounding conditions.

As I understand it, the Warren patents are based upon the combination of large-sized rock, one-half or two-thirds of the thickness of the pavement, together with certain proportions of sand and gravel, all bound together with asphaltum. Such pavements were laid years ago in San Francisco by Larkin and Flaherty, particularly in the business districts, where you will doubtless remember the large pebbles appearing in the sidewalks. The large stones were put in to take the wear, to make the pavements stable, to keep it from moving through heavy traffic. I admire the Warren Brothers' energy in advocating a principle which makes the best asphalt pavement, but under the circumstances I see no justice in the monopoly that has been created by issuing the patent.

During the past few years architects and builders are beginning to realize the economy in use of asphaltum in making houses more habitable and longer lived. The question of water-proofing is in the throes of solution. The necessity of it is more appreciated every day. There are few residences so favorably located but what a small expense incurred in the construction of the foundation and basement would make the house warmer, drier and more agreeable during the rainy season. We have become so accustomed to earth odors permeating our homes that we take it as a matter of course. We avoid using our high basements for other than storage purposes, when, by the proper use of asphaltum in the first construction of the house, considerable space could be gained and made as habitable as any part of it. The application of asphaltum in the footings and exposed surfaces of the foundation will, without doubt, preserve them and prevent the sour odors so noticeable in an old house. The placing of a water-proof course, consisting of two or three layers of felt and asphaltum, in the floors of loft buildings would reduce the insurance, for where fires occur in the upper floors, an immense saving would result by preventing water reaching the stock below.

For roofing buildings, nothing has been found so thoroughly satisfactory as combinations of asphaltum with saturated felts and other materials. The ideal roof covering for comparatively flat surfaces, and the one given the best rating as compared with all other characters of roof coverings, by the National Board of Fire Underwriters, consists of at least five layers of saturated roofing felt, mopped solidly with asphaltum and top-coated, over which is placed one-inch flat tile bedded in cement. This roof covering, to quote from its report,

"affords a very high degree of fire protection to the roof structure, which is not readily inflammable; which does not carry or communicate fire; which does not give off inflammable vapors or gases in large volume when exposed to high temperatures; which possesses no flying brand hazard; which possesses considerable blanketing influence upon fires within the building; and which is durable and requires repairs or renewals only at very infrequent intervals."

There is no other character of roof covering so favorably rated by the National Board of Fire Underwriters as this, but in the next lower class is mentioned the well-laid five-ply felt and gravel roof so universally used.

In some styles of architecture the roof is exposed to view and adds to the harmony of the design. There is no occasion for the felt and gravel roof to be cast aside in such cases, for if reasonable care is taken, the graveled sur-

face can be made to present a uniform appearance that will not detract from the most artistic design. As for color effect, it is a simple matter to spray the gravel, after it is on, with a silica paint and gain any desired color. I mention this to show that the roofer is not of necessity the crude and dirty plodder his appearance indicates, but that he has a hidden taste for the esthetic that only needs to be called for to show itself. Certain combinations of asphalt roofing are used extensively in Southern California on the "bungalow" so peculiar to that district. Nothing more artistic could be devised than some of these structures illustrated in the current architectural papers.

While on the subject of roofing, I will call your attention to an inconsistency in modern building. Asphalt roofs have been adopted because they give better service than metal; still, architects will persist in putting tin at the bottoms of their light-wells, where it is wet half the year, and these light-wells are the receptacle of all kinds of rubbish. A leak in a light-well is always hard to repair, and its location causes more damage, as a general rule, than if it were on the main roof above. If these light-wells were covered in the same way as the main roof with felt and gravel, and then just before the completion of the building, the gravel were floated over with a light coat of asphalt mastic, the cost would be no greater than if tin were used, and a surface would be obtained that could not be harmed. I have mentioned these things simply to show the field there is ahead for the use of asphaltum for roof covering. As I said before, the use of asphaltum is in its infancy and is capable of wonderful expansion in the hands of intelligent architects and builders.

The advent of the automobile has demonstrated how necessary it is to use some form of asphaltum as a binder in the wearing surface of our streets and highways. In cities where the streets have a heavy traffic, great care must be taken in preparing the foundation, and the wearing surface should properly be such an aggregate of materials as will stand the traffic and at the same time furnish a proper foothold for horses. Under the present practice asphalt streets are really dangerous for horses during the cold and damp weather. This slipperiness can be avoided by the use of coarse materials in the mixture. We must always keep in mind that the asphaltum is simply a binder for the sand, gravel and rock that take wear and really constitute the pavement. Where the surface coating is sand, each grain of which is covered with asphaltum, the large proportion of this asphaltum, which will always be exposed on the surface, will render the pavement smooth in spite of any treatment you may give it. But by incorporating a certain percentage of coarse material, held in place by graded finer materials and asphaltum, we will have a wearing surface with a sufficiently hard, gritty substance exposed that the probability of a horse's slipping will be slight, whatever the weather. This is the principle upon which the Warren Brothers' patent bitulithic pavement is based. It is a good principle, and besides doing away with the slipperiness, it makes the pavement stable and less liable to roll into ridges.

In order to insure good work, great care must be taken in the selection of sand, gravel and rock in the laying of asphalt pavements, for the slightest film of dust or loam will prevent a perfect bond with the asphaltum. Where a pavement is laid in courses, it is a great mistake to allow the lower course to lie exposed until covered with dust and dirt before the top finish is applied, for the intervening layer of dirt, be it ever so slight, will effectually break the bond that should exist. The only reason there is for laying a pavement in two or more courses is to make it more compact, the difference in labor in so laying it will eat up what little might be saved in cheaper material in the lower or binder course.

In the construction of our proposed state highways, the great bulk of the materials will be found in the creeks and rivers that the roads will pass over. The character of asphaltum used will depend upon the character of the traffic that each local road will carry. Where there is heavy hauling, good foundations will have to be put in and a carefully prepared mastic pavement applied. On the small feeders, and in localities where there is light traffic, what is known as an oiled road may be built up after the grading and drainage have been attended to. In building these oiled roadways, no set formula can be followed, as the quantity of oil to be applied and the consistency of it depend upon the character of grit at hand. I will say right here, there is considerable manual labor required in all asphalt work, and this human element needs constant supervision. There are few industries where such judgment, care and experience are needed to insure good work. The little details must be constantly looked after. For instance, having any one or all of the materials in a pavement too hot when they are being mixed may be fatal; the difference in temperature from day to day will have great bearing upon how materials work. These and other contingencies must be met as they arise by efficient superintendence. It is reported that many of the oiled roads in Southern California have not been satisfactory. Without having an opportunity to look into the details, I am inclined to believe the fault lies in the oil being of too light a gravity; that being a peculiarity of all natural oil found in that locality. The asphaltum in the oil is what forms the binder, the volatile matter must be evaporated in time, so a heavy gravity oil will be found necessary in almost every instance to get satisfactory results. It is such failures that impress upon the authorities the necessity and economy of competent engineers and superintendents. It is an unfortunate circumstance that the public has gathered the impression that the handling of asphaltum is simply laborers' work. Time and a few drafts on our pocketbooks will convince us otherwise.

Asphaltum pavements will be universally used in time for stables, creameries, factories and warehouses, when their virtues are more thoroughly understood. There is no character of floor surface that will stand the trucking over and abuse like an asphalt pavement; at the same time, it is the easiest to repair in case any fault should appear. Its elasticity makes it pleasant to stand on as compared with cement, and its ultimate cost as a top finish is no greater. The field ahead is without limit as new uses are being found for it every day.

California is producing immense quantities, and of a grade that will compare favorably with the older and better advertised deposits in Trinidad, Venezuela, Sicily and Val de Travers. It is but natural that development in the use of asphaltum will come largely from this state, showing a field for engineers and commercial enterprise at present little developed. California has the goods and the brains. When they are combined, productions will result that will make California again as famous as did her gold mines and her orchards and her vineyards in the past.

* * *

Competition for Y. M. I. Building

Four San Francisco architectural firms have been invited to submit competitive plans for the new Young Mens' Institute building to be erected next to the Masonic Temple on Van Ness avenue, San Francisco. The plans are to be judged in December and the successful architect will be named before the New Year. The building is to cost $200,000. The architects invited to compete are Messrs. Welsh and Carey, Shea and Lofquist, Will T. Shea and J. J. Foley.

A Suburban Aspect

Outdoor Sleeping Room and Screened Dining Porch

The California Bungalow and its Adaptation to Other Climes*

By M. D. HITE.

DISCUSSION of any particular type of architecture has little value unless the philosophy of its origination, the reason for its being, is examined. This leads often into fields and byways which at first seem wholly foreign to the subject; but in little and obscure things and events have many of the world's standards been germinated. Small house designing is always interesting,—whether it is profitable to an office depends only on a business principle. Study of the bungalow's evolution carries one to India, Japan; to Norway, Switzerland; to Spain, Mexico, and to its American locality, Southern California. It will be seen that most of the countries named have developed a high type of wood architecture, that is to say, architectural structure and decoration expressed in wood throughout. The bungalow is, primarily, of wood construction, America's highest development and a worthy one in wood expression. By no stretch of the imagination, should one become facetious, could it be called "wooden" in expression, for it is a facile style and very pliable. I do not hestitate to pronounce it a style, and in saying that it is pliable the intimation is that, being such a free style, the designer must thoroughly understand its development and the motives that have influenced its evolution, or the results will be disastrous. The oft-quoted history of Richardson's Romanesque, its facility and elasticity, and the degeneration of that style in unintelligent hands, can be recalled here. The "bungalow" is not one of such personal feeling, but nevertheless gives opportunity for a reckless degree of individuality.

Small things should be done well, large things are but a multiplication of the small ones, none appreciates this better than does the architect, whose very work embodies this principle; the same items enter into the largest structure, practically, that are used for the smaller,—only an increase in quantities, a re-arrangement of materials. The dwelling, then, the smaller house, is one of a multitude of units that go into the make-up of every community; taken singly it is a minor matter; many offices, unless otherwise definitely specialized, hold it in contempt. And yet the small dwelling is one of the greatest problems looking for a solution from the source that one should nat-

* Illustraions by courtesy of Architectural Art, New Orleans.

Bungalow Designed by Baccich & de Montluzin

Double Terraced Entrance Front House of Mr. Chas. W. Schmidt, Jr.
Baccich & de Montluzin, Architects, New Orleans, La.

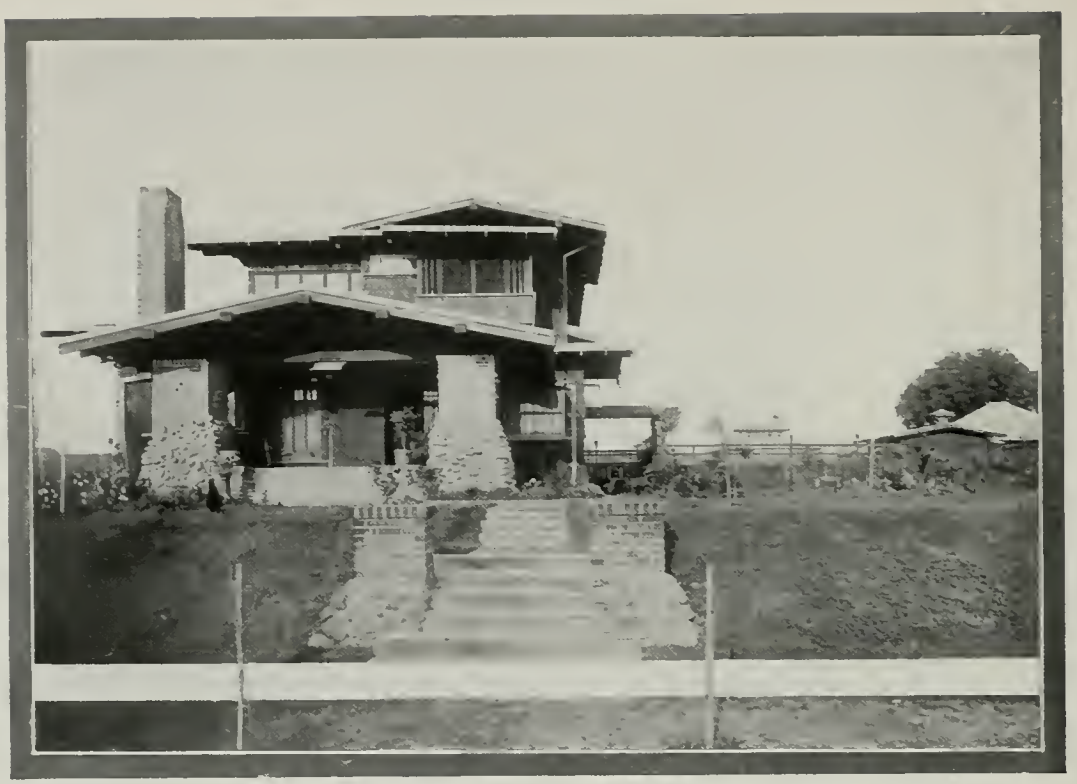
urally expect to give it the benefit of its thorough consideration and experience, the architectural profession. The amount of scientific study devoted by the architects of New Orleans to the question of the small house can be judged by the quality of the average design and plan of the dwellings of this city. It hardly needs to be stated what that judgment would be!

If a community of the size and importance of the City of New Orleans does not dignify architecture, and fails to appeal for architectural aid and salvation to its architects, then something is wrong, and not always with the community, but with the architects themselves, their methods, their organizations (or lack of them). The house and its setting are a vital problem needing the thoughtful consideration of intelligent men; most of the people live in small houses, all live, sleep, somewhere; the greater number of a city's buildings are its dwellings. A new outlook, deeper insight, a scientific examination of the subject in its relation to conditions of life is needed.

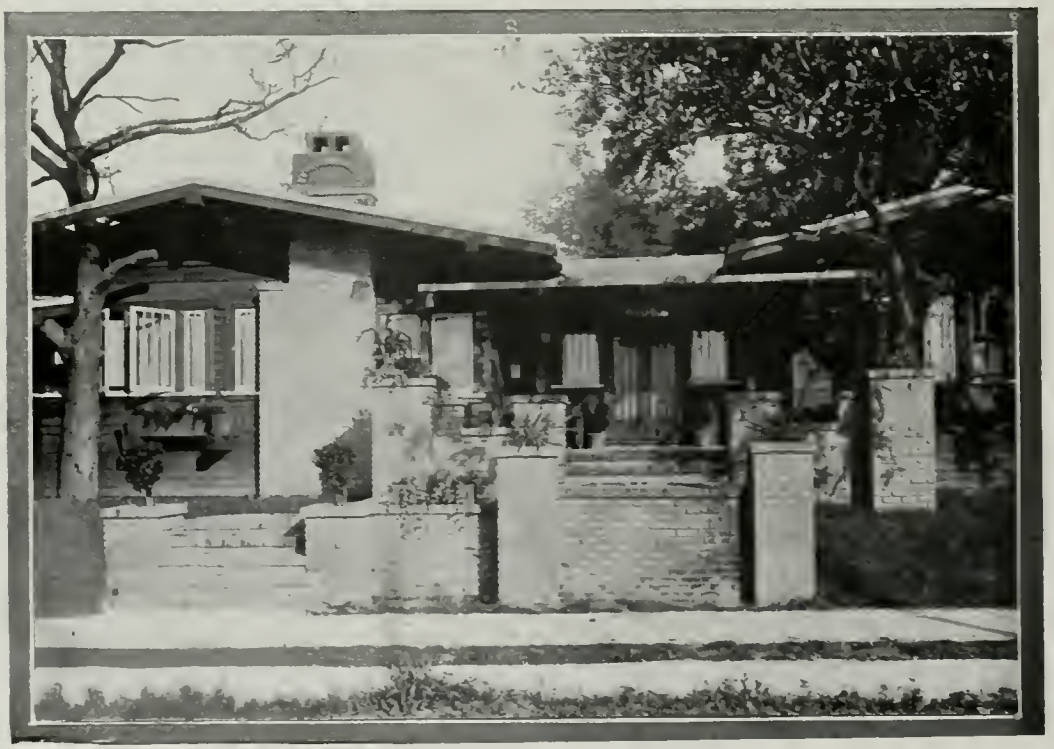
The wood building will be with us, if not forever, at least for a time beyond the present and in great numbers. It consequently deserves serious treatment. That it is wood architecture must ever be borne in mind; nothing should be attempted with wood excepting that which is a logical use of the material. It then produces frank, naive, and charming results. The refinements of the classical may be missing, some of the newest California bungalow work, for example, may seem uncouth, rude, but its boldness of design, while sometimes violating the noise ordinances, speaks bravely for a more honest expression in design, the factor of indigenousness, less rule-of-thumb construction, a more rational plan, the elimination of the non-essential. The latter phrase is often heard but few seem to understand its application.

The "bungalow" should not be confused with what is known as the "craftsman" type, although there is much in common between the two, mainly sincereness. The especial point of divergence is in the fact that the bungalow is designed for southern countries only. The bungalow may embody essential "craftsman" features but a "craftsman" house may not embody the bungalow's essential qualities. Therefore, the terms "bungalow" and "craftsman" are not synonymous. There is a distinction here that the architect should feel, in the same way that he distinguishes as between the various forms of, say, "colonial" work. Comprehension of what constitutes a particular style, or the points of divergence between types, is vital to good design. And even so with the bungalow.

The bungalow's development in Southern California has been largely an outcome of peculiar conditions, natural and economic, but the similarity of those conditions with the present and future of Louisiana and of New Orleans forms an interesting parallel. Over New Orleans' architectural sins of recent times, its lack of cohesion, of definiteness of purpose and while acknowledging the small measure of debt due to some good work, one is willing to pass; this is but the awakening of modern architecture in Louisiana. Opportunities, possibilities, are without limit; energy, enthusiasm and the hope of youth should imbue the profession, for all of its best and finest work here is still to come, and come it must in the inevitable trend of events,—monumental, municipal, public, presidential, commercial, manufacturing, the heaviest part of all this work has yet to be achieved, for the New Orleans of today is but the beginning of a city of the not distant future with its many and newer buildings and greater and newer population. This comes at a time when architecture in the United States is at a very hopeful stage and the city will correspondingly benefit in its new work. In that prospect and that alone does this city gain as the result of its slow architectural growth of the past. And, after all, perhaps the new New Orleans will be much the richer architec-



"The Elusive Charm of the California Style" Designed by Baccich & Montluzin, New Orleans, La.



"Characteristic Bungalow Details"

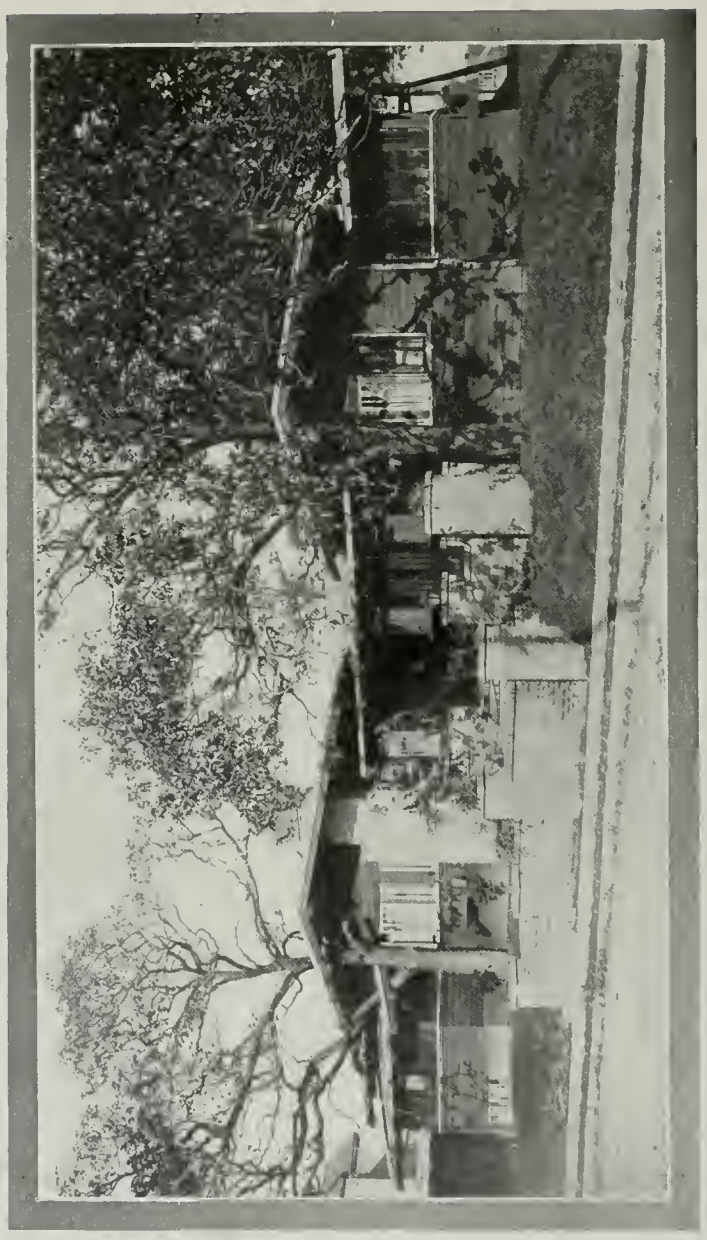
turally for having built so little of importance during the past three decades of experiment, reaction and transition.

A newer country than this and one without a past except for its virile Mission history, is Southern California, and populated largely only in recent years. In consequence the people there are a newer type, of modern mind, American, less bound by traditions than those of an old and settled community such as is this city. The rapid growth, the progressiveness, the receptiveness, to new ideas, the courage to try a thing, or the Angelenos, is thus partly accounted for, for they who have courage to emigrate to distant places, to take up life anew, become as a whole an energetic and useful people, each has his fortune to make, so to speak. This is the history of all emigration, all settlements of new countries. These people, too, go there untrammelled by quantities of massive and ancient furniture, for they come from afar and carry no extra weight. Distance from older communities, too, develops independent methods of thought and action, and in the case of Los Angeles an unique style of architecture in its dwellings—an expression of the general conditions and the life of the people. In its commercial work Los Angeles, like all American cities, follows blindly on the path of tradition. The reason for this is "another story." Its office buildings, hotels, might just as well have been planned in Atlanta, New Orleans, Pittsburgh,—or Paris. But not so with its bungalows!

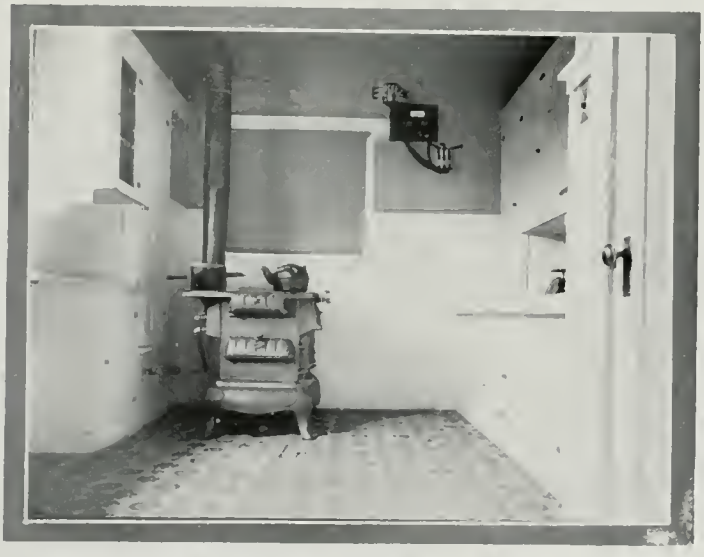
Domestic economy, climatic influences, the absence of the burden of the "classical" (so-called), all share in the fulfillment of an original plan and exterior design. The lack of furniture possessions brought forth the built-in furnishings and the little conveniences that appeal to the woman's mind, with a corresponding diminishment of the sizes of rooms with the exception of a friendly living room, the family congregating place. There is nothing more, nothing less, in the bungalow than sensible requirements, economy of labor, actual problems, dictate. Smaller windows, but greatly increased in number, affording better distribution and ventilation; exposed features of construction; delightful roof schemes,—these and other simple subtleties of design, based altogether on utilitarian motives, make the bungalow of Southern California—though still incomplete, imperfect and lacking in some respects—a beautiful and efficient dwelling. It has evolved through gradual growth, its prototypes can be traced through many stages of development. The newest phase is very different from the earlier "bungalows." The early houses bear marks of Atlantic States influence and show traces of the "Queen Anne" aberrations. The present bungalow is along wonderfully common-sense lines, a rare instance of scientific thought and reason applied to the old, old problem of man's dwelling house. It is in part due to the attitude of the public, in the desire to attain domestic efficiency combined with sincere artistic effectiveness.

To glorify California, to disparage New Orleans, is not the intent herein. To the student of things, the relative greatness and possibilities of New Orleans, because of its location on history's new route of commerce and its dominance over a rich but almost untouched agricultural section, it would be puerile to argue against. The simile is this: The conditions of Louisiana and of Southern California are analogous—climate, inevitable strong influx of population at no late date hence, the coming in with these people of new ideas, new methods, new manners, and the extension of the suburban idea.

Ideas are needed,—intangible but powerful forces,—and the energy to execute. The wand of the Arabian magician could produce no more amazing changes or wonderful effects than that which today lies within the power of the architectural profession. It will raise from ugly, unhealthy and cir-



Typical Southern California Style Bungalow · *Baccich & de Monthuzin, Architects*



Suggestions for Bungalow Interiors

A Bungalow Outbuilding

cumscribed environs, and against narrow prejudices, dwellings of beauty, arranged in a livable form and placed in a setting of flowers, of trees. The tourist who abides here a while and the people who make this city their home, the place where they work, will feel that it is a city of cleanliness, of efficiency, of beautiful ideas, of happy lives.

The magic of the architect has touched Southern California. They have nothing like the great Louisiana oaks, but what they do have they use. The value of the setting is recognized, it is part of the project; unsightly fences; "sheds," are abjured. Fences become by their design component parts of the whole, outbuildings partake of the general character. Natural conditions of the site are utilized, grasped with a true instinct; common flowers are used with tremendous effectiveness,—the brilliant red geranium, the Bougainvillia, the ragged Robin, the Gold of Ophir Rose, the terrace moss. The note of color in the residence sections is intensified by the soft, warm tones of the rough woodwork of the dwellings. The dull grays and wintry tones of other climes are absent. The abundance of a rich country, the fertility of its soil, the love of life, are all exhibited. Gateways, entrances, garden objects, small

A Bungalow Kitchen

outbuildings, are of simple design in rough wood, cement or common brick, and these little things are handled with an honest and unfettered pencil that brings about results both of charm and of bigness.

"A livable house"—simple words these, well understood by English and German architects in their domestic work, and voiced in the bungalow, but the meaning is too subtle for the comprehension of the designer whose training has been received in the 45-degree shadow of the light-killing classical colonnade, in the realm of ephemeral detail, of constructed decoration, of the tin cornice sky-line; his sympathies, his studies are with the Past. There is much to learn in the rolled parchment of Time, inspiration, yes; but Science's open book of Today, the economic and mechanical facts of this century appeal for a manly facing of facts, a higher solution of architectural design. The Greeks lived, and expressed their lives, their ideals; the Romans theirs. We, we are in transition; architecture shows this as nothing else does, a reflection of the depths of shallows, too often the latter, of the people and the times. All this is trite, still pertinent.

To break with tradition is always an act subject to criticism. Men of undoubted reasoning power and intelligence become brain-bound by long devotion to certain ideas. Evolution of a style is slow. The fitness of a specific style, the working out of certain principles, is now being demonstrated by our office. We believe that the bungalow, in its true aspect, will have a large share in the future beautification of New Orleans, and at a minimum cost. Standardization without sameness, exact methods, these are necessary for the successful handling of residence work.

The science of efficiency is unknown to the average occupant of the drafting table, the designer's board, the multitude of "contractor's" desks in New Orleans. Exchange of ideas has not reached a worthy plane.

Architects are busy men, the multiplicity of detail, the multifarious duties, place those who follow Architecture among the exceptional men of the business world. This type of man, then, with the broader aspect, the putting aside of petty jealousies, the furthering of professional intercourse, the rational examination of local problems, the renewal of purpose, can, in the glittering future now imminent for this city, make of his work a word to conjure with!

* * *

Stains on Brick

The brown, white and yellow stains which frequently disfigure brick buildings or walls are the result of a saline efflorescence which may sometimes be removed, according to the *Bibliothèque Universelle,* by washing with slightly acidulated water, when pure water proves inadequate. Prevention, however, is better than cure. The stains are caused by particles of soluble salts which have been carried to the surface by water and are then crystallized by evaporation. These comprise sulphates of potassium, sodium, aluminium, magnesium, and calcium, the last being the one commonest found and the one most resistant to rain. Chlorides and carbonates are also often found. These salts preexist either in the earth or in the waters used in manufacture, or in the mortar or sand, the latter being especially the case near the seashore, where sand from the beach is commonly used without the precaution of washing with fresh water. The entry of salts into the brick may occur during the baking, also, when the coal contains pyrites. Care should be taken to use water of low mineral content, especially as regards sulphates. Where only "sulphur water" is available it should be neutralized with a barium salt (the chloride or carbonate).—*Scientific American.*

The Value of Brick with Good Mortar

By NATHANIEL ELLERY, C. E.

SINCE the increased production of cement and the consequent reduction in price this material has been used in different degrees in the making of mortar for brickwork. In fact the general practice is to temper the lime mortar with cement, although I have seen and handled jobs where there was used cement mortar tempered with lime. This latter, however, is not the rule. It occurs to me that not enough attention has been given this mortar question and it needs much testing and practical working out. The strength of a single brick is much greater than when laid up in mortar. In the case of hard burned brick it may be necessary to get a mortar equal or nearly equal to the strength of brick to get the best of the brick value. For instance, brickwork of hard burn laid up in neat cement mortar is about three times as strong as the same brickwork laid up in ordinary lime mortar. That is, if a pier is constructed of hard burned brick in neat cement mortar stands a test of 4,500 pounds per square inch, then when laid up in lime mortar it stands only 1,500 pounds per square inch. Cement mortar of a 1:1 mix stands an ultimate strength of approximately hard burned brick in neat cement mortar. Again, cement mortar of a 1:2 mix, *i. e.*, one cement to two of sand falls considerably short of the strength of hard burned brick and neat cement mortar in pier. Medium brick when laid up shows little difference in compressive strength whether in cement or lime mortar.

Generally the strength of concretes follow the strength of cement mortars. Here let us look at facts presented by Mr. J. E. Howard of the Federal Bureau of Tests. The relative compressibility of some building materials within their elastic limits are as follows:

Take steel as a standard; then we have hard burned brick three times as compressible, medium burned brick six and one-half times as compressible and neat Portland cement seven times as compressible. This is approximately the relative rigidities of these materials.

Now place the brick in the mortar of the various grades and we obtain varying values of strength, also mix the cement into concrete and the strength reduces as the cement mortar is made lean. We are in need of more investigations of the adhesive power between brick and the mortars. A recent test by the Federal Bureau caused a brick column laid up in 1:1 cement mortar to fail between 2900 and 3000 pounds per square inch of surface. The 1:1 mortar should stand about 5000 pounds per square inch, but such mortar is considerably in excess in cement of our ordinary uses. If we had a cement mortar of 1:2½ then its strength should be about 3,000 pounds per square inch, and this seems to be about the value of the brick used. It is this point that should be exercised in good construction—get the brick and the mortar which best work together for strength. Then good brickwork is as good as good concrete for strength and superior as a fire resistant.

* * *

Open Shop Gaining

In its monthly bulletin the Citizens' Alliance calls attention to the great advance the open shop has made in San Francisco. The Directors of the Panama-Pacific Exposition have taken a stand in giving the fence contract, which means that any reputable contractor, no matter what his affiliations may be, may build and expect to build on the Exposition grounds and that any workingman, union or non-union, may labor within the grounds without fear or molestation. The fence is being built of open-shop material, and the men doing the work are union and non-union men.

Early Christian Art

By F. W. FITZPATRICK

THE early Christians when they emerged from the catacombs and were accorded some freedom, nay, even an independence and soon a control in affairs, took whatever they found ready at hand for their places of newly established worship. The Basilicas or courts were the largest buildings in Rome and the other Christian centers, hence were they, so to speak, impressed into service with little if any change in their arrangement. The judicial table upon the rostrum became the altar, the clerk's lectern, the deacon's and the father's preaching and reading place for the Gospels; the rostrum proper where the jury sat, the chancel and the assembling place for the priests of the new dispensation.

Men were ever prone to adapt rather than invent, so the Basilica became the Christian temple, yet even its name was retained and indeed was it still a place where they dispensed justice, penances and warnings. The old Temples, one would think, would have most naturally been suggested to their minds for religious worship, but, remember, these were small, generally but an abiding place for the god and its priests; then, too, there was a horror, a repugnance felt for anything connected with the old worship, the cause of all their troubles, their persecutions, that the only thing they thought of in connection with those temples was to destroy them whenever they got a chance. Though, later, they turned some of those temples into churches or rather into minor chapels; the Temple of Concord at Rome, for instance, that of Venus at Ulpiana and of Julius Stator became churches in later days. The Pantheon was generally supposed to have been a temple; it in fact formed part of the baths of Agrippa.

We find that as the Christians grew in riches and power they paid some attention to the decorations of their basilicas. With slight changes frescoes of Jupiter were made to do duty for the Almighty Father, nymphs and little cupids became angels and cherubs, and so they went. Later still they built churches of their own, but these were founded, as far as architecture is concerned, upon the old plans, basilicas in every sense.

Still the church grew on; it became the dominant factor in the State. It were time it could stand by itself in Art as well as in politics and statecraft.

The new faith that had risen from the ruins of pagan antiquity, when once strong enough to rest upon its own base, fretted in its borrowed finery. The art, the customs of the peoples who had oppressed it were repellant. All that pertained to them, or that even reminded the followers of Christ of them was revolting—at least at first. Was it not for that reason largely that the Christian counsellors of Constantine advised the upbuilding of a new capital far from Rome and its unpleasant memories? He, a warrior a Christian but in name, a leader of warriors, was fascinated with the charms, the insidious attractions of the Orient and the capital of the world was transplanted to the Bosphorus. Still, nor he nor his followers were artists, though

they saw, appreciated, admired and desired the beauties of all kinds the East set before them.

Some of the Fathers and even some "authorities," so called, in the realm of Art would have us believe that this new form of Church architecture came down from on high all ready made, an inspiration to the builders of that time, an answer from above to the pious prayers of the faithful, or at any rate the invention of the perfervid enthusiasm of Christian artists. But the time of miracles was almost past. Never had or has there been such a radical jump into brand new forms as we know occurred then. Few today suppose the wondrous construction and perfect ornamentation of that capital and the churches that graced it was heaven-born. The reasonable inference is, and it has been established almost beyond debate, that those things were borrowed, grew out of something else, were merely assimilated. And whence?

Construction as typified by this so-called new art of Byzantium, indicated an advanced knowledge of statics, of equilibrium, of complicated mechanism and acknowledged neither Egypt nor Greece nor Rome as prototypes. Perfect as were the parts, the details, the sculptured decorations used in the architecture of these three great teachers of the world, their construction was primitive, infantile, so simple as to be unscientific, a mere superposing of masses, entablatures and roofs upon vertical supports placed close together, structures covering much ground, but rising little above it, a construction one is justified in terming technically "brutal." Egypt piled masses high in the air, true, but building a mound of stone even mountain-high may be impressive, but it is not the art of construction; the monuments of India were but excavations in the rock, with elaborately carven surfaces; there was nothing serious about the monuments of ancient China, dainty they were, interesting but not to be dignified by the name Art. No, the artists employed by Constantine, the architects of St. Sophia and of the other strikingly beautiful structures of Byzantium took none of these for their models, nor did they create a style upon some heavenly inspiration; they were influenced, as were their masters, by the examples of Persian art they saw all about them. In fact, most of them were men trained in the Orient, if not indeed orientals themselves.

Some strange, preservative influence has been at work that permitted that country in spite of its ups and downs and the mutations and vicissitudes of time, the Elam of old, the birthplace of art, to retain its place among nations as the highest exponent of the true science of building, the perfection of form and the correct balance between structure and ornament. The absence of stone and timber in quantities necessitated the use of bricks and materials of small dimensions, hence their skill in handling such small parts and incorporating them into magnificent masses. When wide openings were required the arch was the only means of spanning them. Such construction forced them into the knowledge of statics and into scientific experimenting and calculations. Their inborn love of beauty and color forced them to the use of enamels, dainty pottery, inlays and mosaics. At the time I write of, the art had been brought to a state almost of perfection.

The Romans and other despoilers of the East, admiring these works, had robbed it of much of its portable treasures. The merchants of the West trafficking back and forth—the East was then the great storehouse of the world, the land of gold and of promise and was in much the same relation to the West as was America regarded by Europe in the seventeenth century—had left stations, settlements all along the great highways from India to Rome and to the north built after the manner of the East and filled with its productions. All about Constantinople were such stations, such influences; all breathed of Persia and of Arabia, "Araby the bles't," and of far-off India.

The founders of the new capital were thus already familiar with oriental art, and now as they set about building their city and, subject to the still closer influence of that art, they, men not at all of an inventive race, anyway, were most susceptible to the fascination of their surroundings. Therefore, it is not at all surprising that they adopted the delicate, sensuous and graceful art of their new neighborhood rather than that of their fahers, let alone any prejudice they might have had against the latter for the religious reasons I have before mentioned, and notwithstanding that they had the quarries and the forests and the laborers of the world to draw upon for even cyclopean construction had they desired it, rather than the dainty arcades, traceries and mosaics they did use.

Some wise men of the West have attempted to trace Grecian influence in the art of the new capital. Grecian influence, forsooth! Greece was dead, despoiled, forgotten, no longer visited; its civilization, carried to Rome long before, had become debased, deformed and finally replaced entirely by Asiatic influences, that held most potent sway over the Romans, a people capable of appreciating beauty, but without initiative in art, invention or any creative powers in that line.

Where in Grecian or Roman art do you find a suggestion for the great dome of St. Sophia's? What in the classic orders could insipre the elongated, bizarre and banded columns, the fantastic and weird capitals of the Byzantine works? And their great gilded backgrounds to their vividly colored pictorial representations, done in bits of glass and enameled tile; their mosaics, their fabrics, their jewels, their glassware, their furnishings; were they inspired by the severely correct, albeit beautiful, works of Greece? Can there be any connection between the natural poses and true painting of the human figure by the Greeks and the conventionalized, stiff, almost grotesque figures of Byzantium?

After Alexander's great conquests, and their resultant dislocation of the Persian Empire, its customs and its arts still held sway over, as we have noted, not only the conquered but the conquerors. So after the destruction of Nineveh, of Babylon, of Persepolis, those regions preserved the memories of their former greatness. Any building that was erected was along those lines so well remembered. The spirit of those old achievements was dormant, but it took but a man, some mastering genius, or a great cause to awaken to full life, and refreshed by that rest, all the splendor and grace of old. Such an art was easily resuscitated. The building of Constantinople furnished the occasion, the awakening, the result we have seen all over the world and still feel.

And Byzantium or Constantinople was but the way-station, so to speak, for that grand oriental art on its way to a world-influence. Persia and its art were too far from, too completely separated from Europe, to affect it at one bound. Constantine was thus the intermediary of that powerful Asiatic influence. He employed Metrodorus to build his church, his palaces. Later Anthemese of Tralles, and Isidorus of Milet rebuilt the church as it has been preserved to us. All three were orientals, two of them Persians. Even Justinian II employed a Persian architect in beautifying his capital. Other peoples of the Occident came to Constantinople, as visitors, as captives, as merchants and, admiring the grandeur and beauty of its marvelous works, carried the seed back with them, scattering it about in every direction. Byzantium was truly the pivotal point from which that oriental influence radiated.

Is it necessary to repeat here the old arguments claiming a Greco-Roman influence upon the buildings of Byzantium? Surely not; those old contentions

have been disproved years ago. Persian art, as we have before noted, held sway all about; its arcades, aqueducts, vaulted and domed ceilings, its rich ornamentation, its fabrics, its embroidery, all absolutely unlike anything occidental, particularly Grecian, had reached high perfection. There had been great luxury in their work ever since the founding of the post-biblical cities under the Arsacedian and Sassavedian dynasties. So that the founders of Byzantium found an art already made. From the world over there flocked to the new capital scientists, men skilled in the arts and crafts, as well as great merchants, financiers and the aristocracy of Rome and many other centers. From Alexandria came a whole colony of experts, we might call them, who, having already been deeply imbued with that oriental art, and inflamed with the exalting mysticism and purity of the new faith, quickly adapted that art to the forms, the purposes, the soul, I might say, of Christian worship and life. The square plan of the olden pagan temple gave place to the cross-shapen plan of the church; religious zeal and fervor, supplemented with boundless wealth, made all things possible. That style, Byzantine, indeed, but of Persian birth withal, grew amazingly. Most extraordinary effects were gotten and wondrous feats of construction performed. Under Emperor Basil did that style reach its apogee. Arcades were super-imposed upon arcades, cupolas upon cupolas, arches became more and more stilted, some were pointed, in fact, vast domes were sprung from tiniest supports, color and ornament, that in other hands would have been riotous, were blended into splendid harmony. The men of that day and place were profoundly versed in statics, in geometry, in algebra and equilibrium; they thoroughly understood the values of masses and openings, of lights and shadows, and their works were marvels of combined science and art, epoch-marks in the history of the arts, aye, in the history of the world.

By the year 440, one hundred and twelve years after the founding of the capital at Byzantium and just on hundred years after the building of St. Sophia's by Constance, the son of the great Constantine, the so-called Byzantine style had found a firm foothold in Italy. That year they began a great cathedral at Ravenna, patterned in the main after St. Sophia's, though the Italians found it difficult to divorce themselves entirely from classic forms. The acanthus leaf and the Ionic volutes still had charms in their eyes, and they indulged, during that transitory time, in some strange medleys of those forms with wild animals, flowers, snakes and whatnot that were deemed essential parts of oriental decoration. The fluted columns became thinner and took on lines in the other direction, bands, garlands, lozenges, twistings and turnings. The earlier attempts of the Italians to apply what they had seen in the city of Constantine to their own buildings were certainly crude. The style they evolved, otherwise known as romanesque, might rather be called a travesty upon the Persian daintiness of Byzantine art. Still, the seed was there. The church of St. Cyriac at Ancona (its capitals are absolute copies of Persepolitan works), that of St. Zeno at Verona, and that of St. Mark at Venice are striking examples of that transitory period, the infancy of Byzantine art in Europe.

In many of the buildings of the period immediately following that, notably the work at Padua and Venice, radical departures were made in the general lines; the style became more flamboyant and daring, but, after a little while, they got back to a closer imitation of St. Sophia's in form, in detail and in construction. That church really seems to be the most perfect example of that art. The Turks clung to it, when once they began copying it, more tenaciously than any other people. At Stamboul, for centuries after, every building erected was but a copy of some part of that church. The later structures in Egypt, in Persia, in India and in Russia, even the Kaaba in Mecca, are all traceable to that magnificent model.

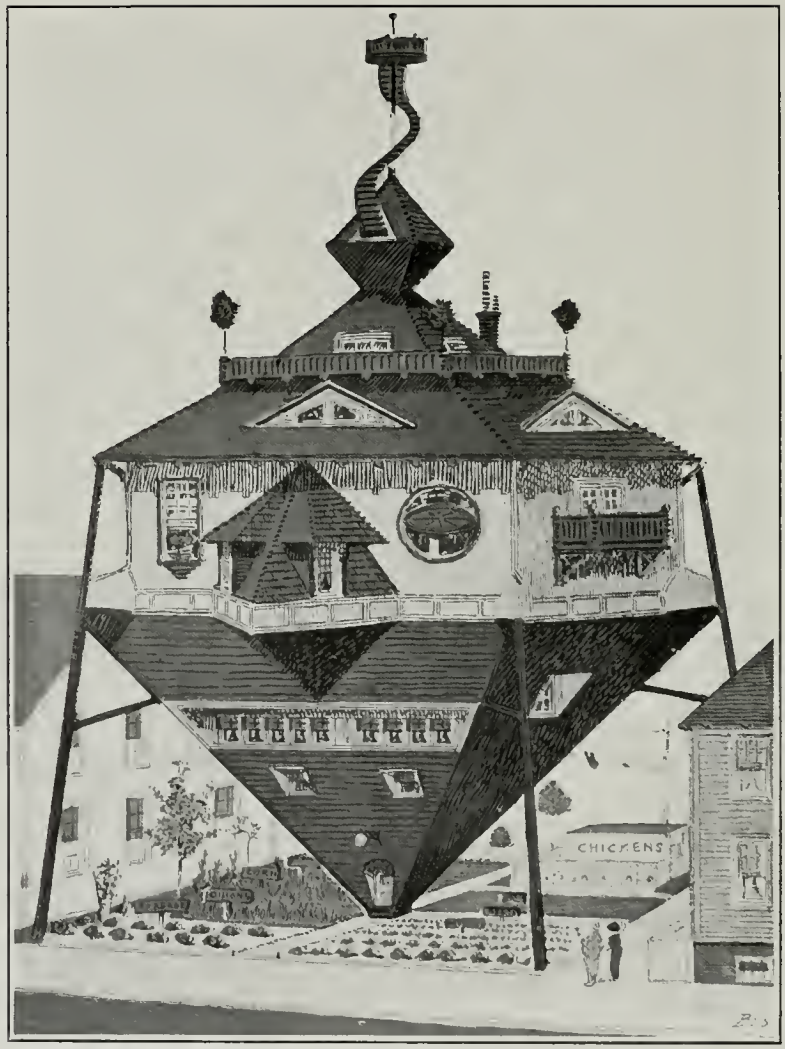
You may follow the old Persian art of Babylon and of Persepolis, down through that of Ecbatana, of Hamadon and of Media, and find that that one example of Byzantine is the hyphen that unites that ancient art to that of Catholic Europe, first called romanesque, then gothic, as well as that of the Mahomedans that finally pervaded the entire world.

It seems strange to have to thank the fanatic Mahomedan as the most important medium of transmission that art of the Orient ever had. With him, as with the Goth, the Ostrogoth, the German, the Gaul, the Illyrian, and the other wild men who made incursions into civilization with the sole idea of rapine and conquest, he was quickly tamed by the refinement and beauty of his unwonted surroundings. In 637 Mahomedan invasions became the fashion. These hordes of wild Arabs—Arabia had lapsed into a state of almost primal savagery; its monuments buried, its people degenerated into herders of cattle and roving bands of robbers—fanatical followers of the prophet, at first destroyed all that fell under their hands. Art and its treasures had no significance for them. Soon, however, it began to exert an influence upon them. No man can live with and see art all about him without soon becoming its abject slave. Then, too, these wild men were of good stock; their forefathers had lived in palaces and worshiped in magnificent temples. Constantinople became their headquarters; St. Sophia their chief mosque. Luxury and refinement grew less and less sinful in their eyes; the oriental within them made itself felt. Persia fell under their sway. With Persian artists in their midst, Constantinople their headquarters, India their storehouse, and fresh art treasures and libraries and masters of crafts falling into their hands every day, they could not long stand the pressure. From brutal barbarity they became protectors, aye, masters of all the arts and sciences. Persian art then became Arabian art—by right of conquest. The followers of Mahomet still carried the sword and ruled by it, but then the highest civilization went along with them. The world never saw greater masters in every line of thought and action than attended the caliphs' bidding in erecting stupendous and beautiful palaces and mosques, in rearing great fortifications, in making splendid roads, in training the young, in making waste places bountifully fruitful, in fine, in civilizing the uncivilized world and greatly improving that part already civilized. Remember that their rule extended over a vast stretch of territory, bounded on the west by the Guadalquiver, on the east by the Ganges! Then you will appreciate the extent of the influence of Mahomedan art—but another name for Persian art, modified, translated, though not enriched by Mahomedan touch.

And Persia still remained the fountain head, the base of supply, the genesis of that exquisite art. Did one want to build a palace or mosque of particular splendor, it was a Persian artist who was entrusted with the commission; when Abderam decided to build the Alcazar at Cordova, it was to Persia he sent for an architect, and who will claim that even classic Greece gave birth to greater artists, men of more exalted ideals, more poetic inspirations and more skillful in gracefully clothing those ideas in imperishable materials than were the artists of the Middle Ages who first saw light in Kashan, in Hamadan or in Geheran?

To the westward that art drifted into what we call "Arabian," and later "Moorish," to the east, India perhaps, of all oriental countries, carried it to the highest perfection. That country's climate, the wealth of its princes, all conditions were favorable to its development. The baths, the tombs, the palaces of Delhi, of Lahore, of Agra, are still—despoiled as so many of them are by native greed or foreign vandalism—the wonder and admiration of all western travelers.

(Concluded in the November Number.)



AN URBAN POSSIBILITY

Novel suggestion by Judge. The idea of building such an architectural monstrosity is said to have emanated from a young artist who thinks he has solved the problem of land, the cost of which is fast climbing beyond the reach of the average man with modest income. The above house is designed to stand on a twenty-foot lot.

Architectural Competitions in Southern California

By JOHN C. AUSTIN

[Los Angeles is having its first experience with architectural competitions. Just how well they are being received is explained in the following article prepared by Mr. John C. Austin, President of the Southern California Chapter of the American Institute of Architects, under the rules of which the competitions have been conducted.—Editor.]

A few months ago it was suddenly discovered by an enthusiastic legislator that an old "Blue Law," known as the law of 1872, was still on the statute books; and simultaneously with the discovery came the overwhelming desire to obey the law to the letter. This was found to be impossible under existing circumstances, so a compromise was decided upon, and the old objectionable form of competitions was again used for all work of a public character.

The old form of competitions allowed anyone who wished to present a plan that he thought might catch the eye and satisfy the desires of the deciding factor, to do so; consequently, drawings ranging from the palatial to the very commonplace were presented for the same problem.

There was no uniformity of rendering, no uniformity of scale, and no maximum figure governing the cubical contents of the building. The consequence was that some drawings were rendered in simple outline, and some colored to catch the eye and by that means cover up many defects in design. A tree well placed would add beauty to the picture and cover a multitude of sins in architecture.

Usually those who decided upon the relative merits of the drawings submitted were men or women who knew nothing of art, architecture, or construction; consequently, the designs for our public buildings were selected from pretty pictures, representing buildings that could not possibly be built for the money appropriated unless construction of a flimsy character was resorted to. That is why we see huge tin cornices, wood columns, representing the five classic orders, so-called ornaments of plaster-of-Paris, and roofs of metal tiles which are an attempt to imitate those made of clay.

Many deciding committees have found to their cost that when the picture that they had selected was reduced to working drawings that there was nothing of beauty left; it was all in the color, shadows, and trees; and they have also found that if the size and beauty were maintained that the money appropriated would not cover the cost, and more bonds had to be voted or the building cut down in such a manner that when finished it bore no resemblance to the original design submitted.

In selecting a picture representing a building, which to a practiced eye, it was obvious could not be built for the money, a great injustice was done to those who had presented a more modest and rational scheme, but the deed was done in ignorance and our public buildings show the result of the competitive system.

After money amounting to many hundred thousands of dollars had been expended the public began to wonder why our public buildings did not show the degree of architectural knowledge as those erected by private enterprise; and the answer to this query was that no self-respecting architect would think of entering competitions that were so obviously unfair.

The American Institute of Architects has a Code of Ethics which establishes a method whereby the public may receive a number of drawings in competition one with another. The method is briefly this: There must be a professional advisor whose duty it is to formulate a program setting forth all of the essential features required in the proposed building. The advisor must establish a maximum number of cubic feet that the building may contain; he must set a uniform scale for the drawings; a uniform style of rendering; a

method by which the identity of the competitor is not apparent; a scale of 6% for the winner of the competition; and adequate prizes for at least two designs next in merit to the winner.

By this method at least one of the judges is competent, and the opportunity of unfairness in the decision lessened. By concealing the name of the author of a drawing, the striving to obtain an unfair advantage by personal influence is eliminated. The prizes to some extent repay for the lost time of energy of a few, the others have simply gambled and lost.

After the old style of competition had been found unsatisfactory to the public on one side and the architects on the other of the more enlightened communities decided to try the method suggested to them by the American Institute of Architects, and wherever it was tried it has proved a success; and I am sorry to say that our northern practitioners succeeded in educating the public officials before we did,—notably, in the competition for the City Halls, both in Oakland and San Francisco.

We were not far behind, however, and to Santa Ana belongs the credit of having first awakened to the fact that they wanted good architectural service. The Board of Trustees decided to erect a High School costing $160,000. and they wanted the best their money would buy. They were told that it was better to employ a good architect without competition, but they answered, "We can't because of the law of 1872"; so they were advised to follow the "Institute Code," and they followed the advice.

The result far exceeded their expectations. There were thirteen firms of architects who competed, and there was hardly a plan that didn't show some meritorious feature. Close study of the problem was evident. There were no buildings that exceeded the cubical contents called for in the program; and while there was a fine display of draughtsmanship the drawings were of one color, and the perspective view taken from one point, thus making it easy to see which design was the best.

It is wonderful to see what a number of forms can be obtained with the same number of rooms each having a given size. Some of the plans showed a very small percentage of hall and corridor space, and some showed a great deal of waste space in this particular. Some of the plans showed poor lighting in the auditorium; in fact, one of the plans only lighted the auditorium from the second-story floor level on one side, all of the other sides having blank walls. Some of the plans showed Science Departments facing the north,—light analysis is one of the principal studies of this department. Only two plans showed a free-hand drawing-room facing the north. Some of the architects seemed to think that the principal architectural features were the wood-working department, the forge room, and the mill; therefore, they placed these departments in the principal corner of the building and nearest to the main street. Some placed the rooms for the study of agriculture and botany on the second floor, thus making it difficult for the ones in charge of these departments to supervise the out-door work which is done in connection therewith.

All of these points, however, were carefully analyzed by those having the deciding vote, and the plans selected had the minimum number of defects and a great number of very clever schemes carefully worked out.

Since the Santa Ana competition was decided upon, San Fernando has wheeled into line, and is going to hold a competition (though for much smaller buildings) along the same lines as those used in Santa Ana.

These two competitions, I believe, will prove conclusively to school boards and other public bodies desiring to build that the methods adopted by the American Institute of Architects are the best for them as well as for those competing.

Steel vs. Concrete

Reply to German Critic on Reinforced Concrete Construction

AT a meeting of the Association of German Ironmasters, held at Dusseldorf, Herr Fischmann, representing the Steel Union, read a paper on the use of steel in building. The greater part of this paper was devoted to a comparison of construction in steel and in reinforced concrete, greatly to the disadvantage of the latter. The Council of the German Concrete Association, considering that the paper in question does not present fairly the relative qualities of the two systems, has issued a formal reply.

Herr Fischmann attributes the decline in the output of steel sections, from 1,200,000 tons in 1906 to 830,000 in 1908, in part to the development of reinforced concrete. It is pointed out, however, that the change is really due to market fluctuations, the output in 1909 having again risen to 1,045,000 tons. There is an admitted increase in the output of steel rods used as reinforcement; and if this has meant a decline in the use of rolled joists, the result is a transfer, but not a diminution of the production. This will be realized on considering the number of purposes now fulfilled by reinforced concrete, thus causing a demand for steel for which steel was not formerly used at all. Such, for instance, are foundations, rafts, piles, wells, retaining walls, embankments, silos, loading stages and inclined planes, external walls and roofs, reservoirs of all kinds, canals and aqueducts, fortifications, dams, chimneys, monumental towers, reinforced concrete bridges as substitutes for masonry or massive concrete, etc. The progress of reinforced concrete, therefore, although it may react unfavorably on the production of joists, cannot but be beneficial to the steel industry as a whole.

The increase in the use of reinforced concrete is due not merely to its cheapness, but, to a much greater extent, the actual advantages which it possesses over steel. The first of these is its greater safety when exposed to fire or to corrosive influences. Whilst unprotected steel expands and softens under the influence of great heat, thus becoming actually a destructive agent, steel properly embedded in cement concrete is to be regarded as a true fire-resisting material; hence its advantage in the construction of houses, schools, theatres, factories, warehouses, etc. The same security is given against rust, thereby preserving the steel and saving the expense of repeated repainting.

The monolithic character of a reinforced concrete structure is not only a guarantee of stability, but also facilitates erection from the fact that the entire structure is erected in the same manner by the same contractor; and the delays and friction inevitable when a number of contractors share the building, as when the materials are steel and brick, are avoided. The great adaptability of reinforced concrete is a further advantage, and gives greater scope to the artistic architect than does steel skeleton construction, a suitable architectural style for which has not yet been evolved.

Herr Fischmann remarks that the statical computation of reinforced concrete structures is still very obscure. The reply made that certain difficulties still remain in both systems of construction, but that the vast amount of experimental work completed or in progress in the great testing stations actually places reinforced concrete in a superior position to steel, the introduction of which antedates the founding of these laboratories, so that its statical rules were necessarily arrived at on theoretical grounds.

How steel construction suffers from its lack of experimental work, is seen from Prof. Bach's experiments on U-beams, published in 1909 and 1910, from which it appears that the strength of such beams fell in all cases below

that calculated, to the extent of from 8 to 34 per cent in the case of loading in the plane of the principal vertical axis. The factor of safety of reinforced concrete structures actually increases in the course of years, owing to the progressive hardening of the concrete. No case is known in which a structure properly erected in accordance with the official method of computation has proved insufficiently strong. The monolithic character of such structures gives them an exceptional power of adaptation to dynamically varying stress.

The objection is also raised that the construction of a reinforced concrete building in accordance with the design is very difficult. This is not the case, and accidental variations in the placing of the reinforcing rods still leave a wide margin of safety. The error from this source does not exceed that due, in steel construction, to the eccentric placing of flanges, effects due to torsion, and the like. The custom of neglecting the tensile strength of the concrete is a further safeguard. The strange remark is made by Herr Fischmann that, should the reinforcing rods happen to be, for example, 10 mm. in diameter instead of 11 mm., the quantity of metal introduced would be insufficient. It would, however, be remarkable if a modern rolling-mill were to send out material so variable in size. Actually, owing to the wear of the rolls, rods are commonly slightly thicker than their nominal section.

The variability of concrete is a further objection raised against it. It is true that concrete from two different sources may differ widely in properties; but the experimental work already accomplished has made it perfectly possible to determine what will be the strength of a concrete prepared from given materials under given conditions. By the German regulations the contractor is bound to satisfy the building authority that the materials and mode of mixing he employs actually yield concrete of the strength required, by means of tests on 28-day blocks, or, when this would cause too long a delay, by tests after 14 days, the 28-day tests being carried out subsequently as a confirmation. Small variations in the strength of the concrete are negligible, in view of the fact that the compressive stress allowed is only one-sixth of the breaking stress. In steel under tension, whether in steel structures or in reinforced concrete, the determining quality is the elastic limit, and this is only two-and-a-half to three times the stress allowed. Further, a building is not usually loaded until more than 28 days after its erection, and the strength of the concrete is then greater than that indicated by the tests.

The comparison made by the reader of the paper is between badly constructed reinforced concrete work and well-constructed steel work. This is not a fair method of comparison. Disasters due to bad work or faulty design have occurred in recent years in structures erected according to both systems, but are not to be attributed to inherent defects of these systems.

Herr Fischmann attributed a part of the progress of reinforced concrete to the fact it is a novelty. This is contrary to all experience. In no industry is there more conservatism than in building. This is easily conceivable when we remember that buildings represent the sinking of large capital, and that they are intended to be permanent. Builders and owners are therefore naturally reluctant to use any but well-known materials or methods, or to adopt any novelty the use of which may be attended by risk.

As a matter of fact, concludes the Council of the German Concrete Association, reinforced concrete construction has had to contend with many prejudices and with much opposition; and if, in spite of this, its progress is a triumphal one, it owes it in the first place to the simple and rational principles underlying it, and to the technical and commercial advantages which result therefrom.

Modern Uses of Brick

By W. S. LLOYD

RUSKIN, whose wonderful eye for the good and beautiful often saw "books in running brooks, sermons in stone and good in everything," once declared:

"Our fields of good clay were never given us to be made into oblong morsels of one size. They were given us that we might play with them and that men who could not handle a chisel might knead out of them some expression of human thought. In the ancient architecture of the clay districts of Italy, every possible adaptation of the material is found exemplified; from coarsest and most brittle kinds used in the mass of the structure to bricks for arches and plinths, cast in the most perfect curves and of almost every size, strength and hardness; and moulded bricks wrought into flower work and tracery as fine as raised patterns upon china. And just as many of the finest works of the Italian sculptors were executed in porcelain, many of the best thoughts of their architects are expressed in brick, or in more plastic terra cotta; and if this were so in Italy, where there is not one city from whose towers we may not descry the blue outline of Alp or Appennine, everlasting quarries of granite or marble, how much ought it to be so among the fields of England! I believe that the best academy for her architects, for some half century to come would be the brick fields, for of this they may rest assured, that till they know how to use clay, they will never know how to use marble."

And the sculptors and architects who are still alive to beauty in spite of the great utilitarian demands of the times, have proved worthy this advice, as the recent Chicago display of the clay workers' art amply revealed.

Probably nothing was more striking in this great exposition, which we may take as highly characteristic of the modern uses of clay, than the great variety of color and texture of the brick of today.

Charles M. Price declares that while it may seem true today to say that values of the greatest aesthetic significance may be obtained in the brick work, twenty years ago this statement would have excited the derision of every architect and builder in the land.

The later 19th century idea of brick work as we can recall it in the long rows of newly built western cities or in green-shuttered Philadelphia was one vast expanse of monotony.

The vogue, as this writer puts it, being for absolute smoothness and unending evenness, "made possible that unspeakable monstrosity of walls painted in a blinding red, with evenly spaced brick courses marked out in white lines. The logical structure of the material was deliberately ignored, treated as though the builder were ashamed of his material, for even the real mortar joints were not followed in the painted parody over them, which might as well have been done on a board fence. The truly fastidious builder indulged in painting his honest red bricks a sallow yellow color, with brown joints, or, if he desired a very tasteful effect, he used a weird viridian green with black or pure white joints overpainted.

"This was not brick work—it was a travesty, a deliberate negation of all the value of brick work, and if it was no less stupid than many architectural fallacies obtaining at the time, it was certainly more utterly hideous than most of them."

It is to the late Stanford White, whose daring originality was based on such wonderful correct knowledge of "values," as the painters express

it, that our emancipation from this thraldom of monotony is largely due.

Just as John La Farge discovered the beauties of irridescent glass and revolutionized the stained glass processes by an accident of the sick room, astonishing an old glass maker by asking him to save all his old scraps of glass, so Stanford White, "in delving among the oldest buildings at Cambridge, perceived that one of the most significant charms of these old Harvard buildings lay in the texture of the brick work occasioned by the random introduction of burnt, or slightly discolored, bricks in the wall. He subsequently amazed a brick dealer by definitely specifying and personally selecting a large percentage of the bricks for his building in hand of the sort usually thrown out as seconds."

The facade of the Colony Club in New York was the first visual expression of White's discovery. He threw all precedent to the wind, scandalizing the conservative and delighting the aesthetic by using brick, both plain and burnt, in the nature of tile or tile mosaic for purely decorative purposes. The entire front of the building was laid with only the ends of the bricks showing, some of the natural red and some in burnt gray, purple or dark green, and the whole diversified with panels and sinkages. The joints were all in line, like a checkerboard, and the whole was so subversive to all established ideas of brick work that it created a storm of controversy in the architectural press throughout the country. From the babel of approbation and condemnation finally arose the acceptance of this amazing "tour de force," and its adoption by progressive architects was universal and as productive of happy burnt bricks.

Thus the old traditions were broken down and we were at once amazed at what could be accomplished in modern brick in aesthetic treatment.

"With these departures from the old traditions in brick work firmly established," says the above quoted writer in Contract Record, "it was not long before the manufacturers rendered further developments possible. The setting of regular two-inch by four-inch by eight-inch bricks in ingenious and aesthetic ways was practiced in infinite variations, with the structural joints forcefully expressed and the material used frankly employed.

"One manufacturer, firmly convinced that the idea of expressing texture in brick work was a great aesthetic discovery, bent his energies to the production of various bricks which should allow the architect a wide range in color, shape and texture.

"Beginning with new shapes, wider, flatter and longer than ordinary bricks, the various shapes were cast in certain groups of soft coloring, which if properly blended in selection may, in an interior, be found to reflect the rich values of an Oriental rug, and be admirably set by dark wood work. These possibilities may readily be realized by a consideration of colors and shades which may be commanded from the various groups. Thus the 'red group' includes not only varying shades of red, but a certain proportion of coppers, olive greens, purple, browns and blues. The 'gray group' includes various shades of brownish gray, running into cream and coffee and deep russets. The 'golden group' includes shades from a soft, delicate chamois to a deep golden brown. The full range of either group may be used in a single fireplace or facade with a delicately harmonious result, or the solid colors may be used for greater mass effect. In exterior treatments, blank wall spaces or the frieze under the eaves may be richly diversified with decorative panels, using colored bricks as a tile mosaic, which though structurally bonded into the wall, will possess the value of applied faience treatment.

"The way has been opened for infinite possibilities in brick building, and architects are making the most of the discovery of the importance of 'texture,' 'local color,' and 'incidental interest' in brick surfaces.

"It is indeed the day of the brick, and so beautiful and interesting are the results now obtained in color and texture that it is absolutely impossible that a return to the days of stupid monotony and dead inertia in brick building could ever be effected."

The result of all this was not only plainly visible at Chicago, but it is evident in every city and hamlet of the land. The present day manufacturers are turning out brick in every variety of texture and color, white to black, pink, through every shade of red to dark crimson and brown, all shades of yellow, gray, green, mottled, iron spots, etc., and in a great variety of sizes from a small "pony" brick 6 inches by 3 inches by 1 inch to brick measuring 18 inches by 6 inches by 2¼ inches, and from a very smooth to an exceedingly rough surface. The architect having at his disposal an almost unlimited range of color, instead of having a building with the walls of one uniform shade, is using a great range of color as can be obtained from the one clay—in reds using the kiln run from light red to brick that is almost if not altogether black; in greys from a light mouse grey shading off to dark grey brown; and at other times using a combination of various colors as well as shades.

In many of the brick a great range of color is obtained from the natural clay or mixtures of different clays, while with other clays iron ore, manganese, iron oxides and other substances are added to and used with the clays and burnt into the brick, giving an architect an endless variety to choose from.

Diaper work in brick has also taken a firm hold on the imagination of architect and manufacturer. The word of course takes its meaning from linen cloth woven in geometric pattern; a simple figure repeated.

As some one has pointed out, this pattern should never be too insistent so as to interfere with other features of the building.

That there is still much room for improvement in the manufacture of brick no one who has learned the possibilities of really well-made brick can doubt.

The age is utilitarian and commercial. It is only men like Stanford White who can make the almighty dollar mark lend its curves to really beautiful lines and force the coiner to adopt that method of production which will please the eye as well as producing a profit.

Nor is the manufacturer alone to blame, for unless the contractor himself has the desire to be something more than a "jerry builder" and lays his brick with a little conscience mixed in his mortar, neither architect nor contractor can obtain proper results.

However severely plain a building may be, says a modern authority, some form of detail or ornament can be introduced which will give interest to it, and many simple forms can be used that always prove effective, and at the same time need not be omitted on account of the plea of additional expense. What an effective form of ornament, for example, is found in countersunk or projecting string or belt courses! Such a course between two floors will transform a distinctly plain and unprepossessing building into one of interest. In old buildings frequently is to be seen, with good effect, round arches above square windows, the tympanum (the part enclosed by the curved top) of the arch being sunk several inches. Another simple form of ornamentation is to be found in the quoins so often met with on buildings of Georgian and Colonial date. Their interlocking appearance imparts an air of solidity and strength to a building.

So expert have some manufacturers become, however, that the tapestry brick now obtainable contains all the delicate tones of a fine Persian rug. The peculiar rough texture is a marked feature of the best of their products, for

they catch innumerable glints of light and shade just rivaling in their beauty of a Royal Bokhara rug, varying only from the tapestry in their rough mortar points.

Our Colonial forbears had this knack and we have recently discovered that the Colonial brick work owes its beauty of color and texture to this same roughness of surface.

As another authority says, singularly enough, this awakening to the ancient beauties of some of the Colonial brick has been coincident with the development of rough textures in many works of man. As highly finished broadcloth with its flat color is no longer popular for men's clothing; the smooth, shiny varnished surface has largely disappeared from our furniture; wall paper has taken on a rough texture; the rough stained shingle is superseding the painted clapboard; and even in men's hats, the rough textured finish is rapidly displacing the smooth felt of a year ago. Everywhere man is discovering that rough texture means softness in effect—therefore restfulness to the eye—therefore good art.

We have traced its ancient lineage from almost the dawn of civilization to the present day, we have noted its claim to durability and those lasting qualities which we like to find in our friendships as well as in our domicile, we have now noted its aesthetic possibilities, its amenity to artistic treatment and we may later add a word as to its economic values.

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Method of Depositing Concrete Under Water

THE committee on masonry of the American Railway Engineering Society, during the recent convention held at Chicago, reported on methods of depositing concrete under water. The inquiries made by this committee embodied methods for depositing, depth of water and results. The following ten conclusions were submitted and adopted:

Concrete may be deposited successfully under water, if so handled as to prevent the washing of the cement from the mixture.

Cofferdams should be sufficiently tight to prevent current through the pit, and the water in the pit should be quiet.

The concrete should be deposited in place by means of a drop-bottom bucket or a tremie, and should not be allowed to fall through the water.

Where a tremie is used, it should be kept filled with concrete up to the top of the water level, and the discharge end should be kept buried in the freshly deposited mass to prevent emptying, and raised a few inches at a time as the filling progresses.

Where a bucket is used, it should be carefully lowered to the bottom and raised to the surface, so as to cause as little disturbance as possible of the water.

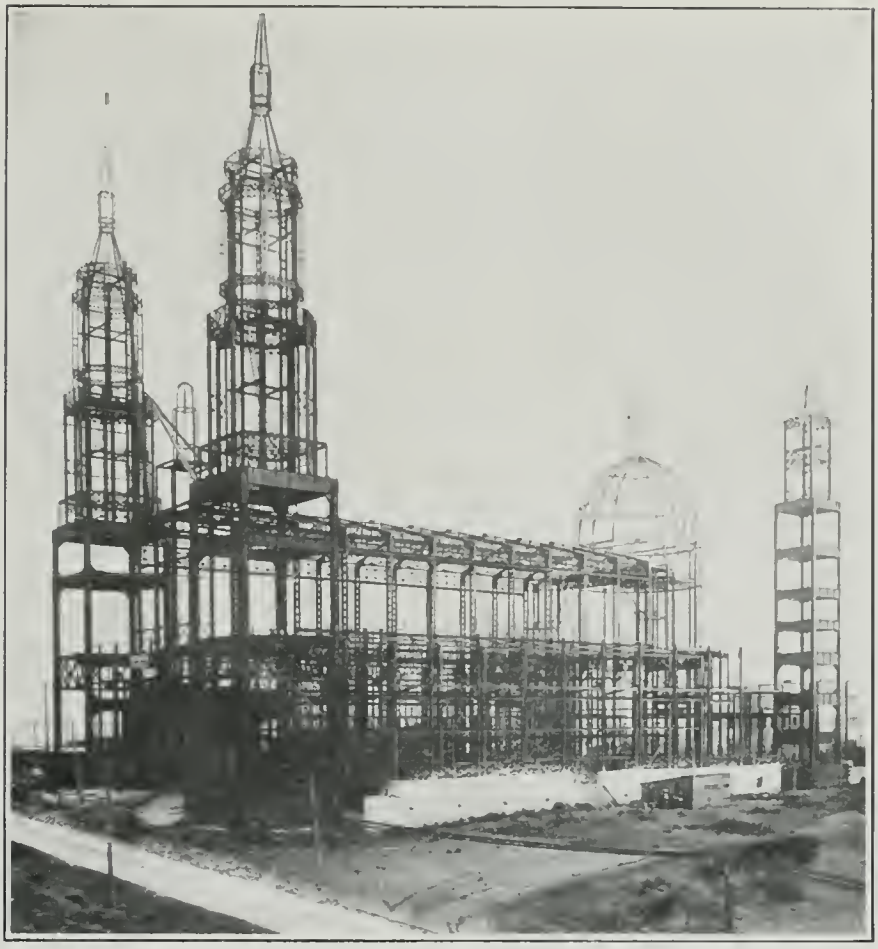
The surface of the concrete must be kept as nearly level as possible to avoid the formation of pockets which will retain laitance and sediment.

Where concrete is not deposited continuously, all sediment should be removed from the surface of the concrete, by pumping or otherwise before depositing fresh concrete.

The concrete should be a 1:2:4 mixture of a "quaking" consistency.

Freshly deposited concrete should not be disturbed.

In open water or where the flow of water through the pit cannot be prevented, concrete should be deposited in cloth sacks.



Steel Frame, St. Ignatius Church, San Francisco *C. J. I. Devlin, Architect*

Largest Steel Frame Church West of Chicago

FROM a structural standpoint the new St. Ignatius church now being erected on the block bounded by Parker avenue and Fulton street, San Francisco, is the largest and most intricate of anything this side of Chicago. The immense steel cage weighs more than 1,000 tons and covers a space 160 by 275 feet. Notable features are two towers in the front of the building rising to a height of 225 feet. In the rear is a great dome 160 feet high and having a diameter of sixty feet. A feature not found in most churches is a campanile built separate from the main structure and constructed of heavy girders of sufficient weight and strength to prevent all possibility of vibration from the bells. The main body of the church is 75 feet by 175 feet and will contain a magnificent organ loft gallery as well as a large student gallery, all constructed in cantilever design. The church occupies one of the highest eminences in the city and the surrounding country for many miles may be seen from the towers which rise to a height of over 600 feet above sea level. The edifice was designed by Architect C. J. I. Devlin and the structural steel was fabricated and erected by the Central Iron Works, of which A. A. Devoto is president.

The City Beautiful

IT IS a time-worn phrase, "The City Beautiful"; yet to thoughtful minds these three words contain a sad reminder of opportunities for civic dignity and splendor that are being uniformly neglected in the upbuilding of the mighty cities of our western hemisphere, whose lusty growth is the wonder of all the world. The city wonderful, the city costly, the city luxurious, we have within our borders in plenty, but of the city beautiful, how few!

Therefore we welcome, as all lovers of their country should, the effort of the Municipal Art Society of New York to bring about co-ordination among those important interests which are concerned in a large way with the laying out of urban and suburban property, and the construction of the more important city buildings.

The failure of New York city, and most of the larger cities of the United States, to present to view those open plazas and spacious boulevards surrounded or flanked by municipal buildings of dignity, and so placed as to present a harmonious architectural combination, is not due to any lack of enterprise or want of capital for construction, but rather, and we might say almost entirely, to want of foresight, and the failure on the part of the municipal authorities, at least in the earlier days, to pay any attention whatsoever to the question of the future architectural and aesthetic appearance of the city.

Such important structures as railroad terminals, steamship and ferry docks and landings and bridges for spanning our great rivers, to say nothing of imposing municipal buildings, should always be planned with reference, not merely to their utilitarian purposes, but to their architectural fitness as related to the site on which they are built, and the character of the architecture by which they are, or in the future are likely to be, surrounded. The principal cause of the lack of beauty in our cities is to be found in the want of any such co-ordination and supervision in the years gone by. Almost invariably there has been too much individualism, and streets have been laid out and buildings erected according to the passing mood or whim of the city department or the supervising architect in charge. Hence that distressing lack of harmony which completely robs of its charm a street, a public square, or a collection of civic and commercial buildings, which, had they been grouped on a well-ordered plan, would have possessed sufficient dignity and beauty to place them in rank with some of the finest and best districts in the older European cities.

The Municipal Art Society has communicated with the leading railroad interests and the commissioners of the tenement house, dock, and other city departments having control of municipal buildings, and has requested their advice in drawing up a revised city plan which shall modify, as far as possible, present defects, and make provision for careful regulation in the future. Although we cannot pull down our cities to rebuild them upon a more wisely ordered plan, we can, at least, make sure that in future extensions or rebuildings the laws of harmony shall be considered. At the present time, hundreds of millions of dollars are being expended in New York alone upon construction, and it is the aim of the society to so direct this expenditure in regard to the aesthetic and architectural effects produced as to develop, in the course of time, a practical, comprehensive and ideal plan for the city of New York. To this end they will shortly issue a map of the new city as proposed, which will be scattered broadcast and posted in all public places. We heartily commend this movement to the attention of the citizens, not only of New York itself, but of every one of those great civic centers which the recent federal census has shown to be having such phenomenal growth.—Scientific American.

Government Helps to Prevent Possible Timber Shortage

CHIEF Forester Graves recently visited San Francisco to make final arrangements under which a California lumber company will purchase 800 million feet of timber on the Sierra National Forest. The timber has already been awarded, after public advertisement, to the highest bidder, but under the terms of the advertisement the final signing of the contract will not take place until the company has been shown on the ground what timber the Government will reserve from cutting in order to preserve good forest conditions and provide for reproduction.

The company will be allowed its full 800 million feet, but naturally it will not be allowed to cut clean. As a rule the Forest Service reserves something like one-third of the forest stand in applying forestry on Government holdings. A marking board made up of one man sent from Washington, one from the District office in San Francisco, and the local Forest Supervisor will carefully mark a sample area, to show how the restrictions on cutting will be applied. Representatives of the company will then go over this area, after which Chief Forester Graves and his assistants will, it is expected, make final arrangements with the company in San Francisco, and the contract of sale will be signed.

"The Forest Service," said Mr. Graves in speaking of this sale, "has received a number of inquiries whether in selling so much timber to a single purchaser the Government may not be opening the way to a monopolistic control of local lumber markets. Other correspondents are disturbed lest the sale prove a bad bargain for the Government through the rise in value of the timber in the twenty-two years during which the company will cut.

"Such large and long-time sales of National Forest timber as that to the California company are a new development in the Forest Service. Great bodies of mature but inaccessible timber can be put on the market only if sale contracts are let on terms which will justify a very heavy initial investment in transportation facilities. In entering into such contracts, however, special safeguards to protect the public against monopoly and to prevent an undue speculative profit to the purchaser are employed.

"The National Forests contain, in all, the equivalent of nearly 600 billion feet of timber now of merchantable size, besides young growth for future harvest. Because of its remoteness from market and the wild, mountainous country, without transportation facilities, in which most of it lies, only a small percentage can now be sold on any terms. Most of it would cost more to get it out than it would bring. The sale of less than one-fifth of 1 per cent of our total supply to one company leaves plenty of room for competition by other companies.

"The timber which has been sold to the California company lies well back in the Sierra Nevada Mountains and will require the construction of 70 miles of standard-gauge railroad to open up the area. Since this road will also open up other National Forest timber and will be a common carrier, it creates another safeguard against monopoly. The company is given a cutting period of twenty-two years to remove the timber, besides an additional two years for the construction of logging and manufacturing facilities. The sale was publicly advertised for six months in order to give an opportunity for all who wished to compete for the contract to make bids, as is done in all large National Forest sales.

"No business organization would undertake the heavy investment necessary in such cases unless the handling of a large body of timber and a sufficient

period in which to remove it under practicable logging conditions are assured. The great difficulty in making such long-term sales is to establish a price which will be fair to both sides. No one can foresee future conditions well enough to know what stumpage will be worth ten, fifteen or twenty years hence.

"Consequently the terms of sale provide for the readjustment of stumpage prices every five years. The basis for fixing the prices will be, in each case, the prices of manufactured lumber in the markets where the timber is sold during the preceding two years.

"For several years the Forest Service has been selling in the neighborhood of a million dollars worth of National Forest stumpage per year, but this combined with what is cut for free use is only about one-eighth of what might be cut without reducing the permanent stock of the Forests. The supply will be kept up through growth. By making long-term sales it will be possible greatly to increase the amount available for present needs of the timber consuming public, without endangering future supplies through overcutting. It will always remain true, however, that vastly the greater part of our timber sales will be to small purchasers, who are favored wherever possible. Monopoly is impossible as long as the door is kept open for such purchasers. Out of over 5,600 sales made in the fiscal year 1911, about forty were for over $5,000 worth of timber to a single purchaser."

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Papering Rooms

The quantity of paper required for a room is calculated in various ways. First, it must be remembered that a roll of paper on which all prices and estimates are given, measures, when selvage is removed, 1½ feet wide and 24 feet long. Although many American papers come in lengths half as long again as this, and English papers 48 feet instead of 24, the single roll remains the standard recognized measurement for wall coverings. A roll, therefore, contains 36 square feet. By taking the square feet to be covered in the room and dividing by 30 instead of 36, the result will give the number of rolls required, with safe allowance for the waste which will occur in cutting around windows, doors and mantel and the amount discarded from the end of each piece.

Another method is as follows: Assuming a room to measure 14 feet by 12 feet and to contain two windows, each 3 feet wide, and one folding door 5 feet wide, the perimeter of the room comes to 52 running feet; with openings substracted it nets 41. Paper being 1½ feet wide, 28 strips would be required, to which should be added about three pieces to cover waste in matching the pattern and otherwise fitting around the openings. This makes a total of 31 strips. Assuming the room to be 10 feet high, a single roll will supply two strips, and therefore 16 rolls may safely be counted as necessary for the room. —*Building Age.*

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Casey's Picture

Casey decided to go into business; so he bought out a small livery stable, and had a painter make a sign for him showing him astride a mule. He had this sign placed in front of the stable, and was quite proud of it. His friend Finnigan happened along, and stood gazing at the sign.

"That's a good picture of me, ain't it?" asked Casey.

"Sure it looks something like you," said Finnegan, "but who the divil is the man on your back?"

"Nerve" in the Contracting Business

THERE are many ways and methods for contractors to expand their business. A list occupying a column could be set down. Ask anyone what is the most essential thing to assure success and make a contractor's business expand, and in ninety-nine cases out of a hundred the answer would be "Ample Capital."

As necessary as capital is, yet in the writer's opinion there is one requisite that is more essential than capital, namely, Nerve. It is true that nerve must be accompanied and backed up with integrity, judgment and capital, but without the necessary nerve or backbone, a contractor will never obtain a large business. The same characteristic may be given many other names as bravery, backbone, tenacity, foresight, determination and others, but among contractors it is called nerve.

History is replete with men who have achieved success through their nerve. Alexander, ruler of the small kingdom of Macedonia, conquered the world. Napoleon, born a poor boy, stirred all Europe and won for himself an imperial crown by nerve. Lincoln won his proud distinction by determination. Gould and many others of the modern financiers made their fortunes by nerve.

Many successes have been achieved in the contracting business by nerve. A prominent contractor of New York City undertook a large contract in a foreign country some years ago, and on the day he signed the contract he had spent his last dollar and that night when he went to bed he only had a quarter in his pocket. The next day he arranged for ample backing and carried out his contract successfully.

A contractor of the Middle West, who today is a very wealthy man and controls several railroad stations, started out in the construction field as a teamster, and by hard work and frugality soon owned teams of his own and was doing contract work. In 1889 the railroad for which he was working went into the hands of receivers and he lost all he owned. Again, after getting another start, he lost out on a contract within a few years, but he never lost his nerve, and within a few years he had under way contracts amounting to several million dollars, clearing in one year about half a million dollars in profit. This was done by nerve, coupled with other ability.

Another prominent contractor has shown his nerve by undertaking contracts of any kind and any size. He considered that a job could not be too small or too large for him, and that no job was too difficult. Even when he was financially involved, he never lost his nerve, but believing in himself and his own luck, he swept all difficulties aside and went on to success.

Many examples like this could be cited. The writer knows of the case of a man who walked into a town penniless, and yet when he learned that a railroad contractor wanted to sublet some masonry work he had the nerve to tackle the job, obtain the necessary tools and supplies, and he made money on the work. In other cases contractors have spent their last cent to obtain a contract, and then shown their nerve in getting started. Two brothers started a piece of work by borrowing picks, shovels and wheelbarrows from their neighbors until they had earned an estimate to purchase more and have teams to put on the work. When they finished this job, they owned a small outfit and had about four thousand dollars in cash, enough to start a much larger job.

One might say that there are cases of where men have had nothing to risk and all to gain, so that it was not difficult for them to show their nerve. This is true to some extent, but the world is full of men who have had similar opportunities, and of men who have possessed a good paying business, yet when misfortune overtook them, or when a good chance was offered them,

they lacked the nerve and push to go ahead. Others have gone out and made the opportunity, while thousands are like Mr. Micawber, always waiting for something to turn up.

But a man with ample capital and a good going business often shows a lack of nerve. This is sometimes due to a man not having much ambition, that is, he is easily satisfied, and if he is making a little more than a living, he believes that is enough. Others have the ambition, but they are timid. They hesitate regarding new undertakings and they are doubtful as to their own ability.

The habit of hesitating and waiting is always a disastrous one in contracting. Some years ago the writer was associated with a company that lost much money through this fault. If they were advised some days or weeks in advance that certain tools, machinery or supplies were needed, days and sometimes weeks were spent in consideration and discussion as to whether or not these things were actually needed, and they were only purchased when it became evident that money was being lost for the lack of them. Then a hurry order was sent to the nearest dealer and the tools and machinery were rushed to the work at a high cost.

This was in contrast to the company whose employ the writer had just left. There the purchases were anticipated, due consideration given to them, time taken to get quotations from various dealers, and the purchases made for the lowest money and the things placed on the work in advance of the time for their use. This meant that the best tools possible were bought, and for the lowest cost; extra money was not spent in being in a hurry, the work could be planned in advance to be done in the most economical manner, and money would not be lost by the forces waiting. A dozen shovels or picks might mean a loss equal to many times their cost.

Mature consideration should always be given every detail of work, but many contractors lack the nerve to go ahead and make expenditures in advance.

So it is with large undertakings and new contracts. The young man starting out should be careful not to overreach himself. He should be cautious, not attempt too much at first, as he must learn himself and first build up a good organization. But the contractor who has had some years of experience should not hesitate to reach out for new worlds to conquer.

The fact that one may not have done the same work before or that the job is much larger than those he has previously done, should not deter him. No one man can look after all the details of any large job, he must depend upon hired help, and it is always possible to hire men experienced in different lines of work, or obtain experts to instruct his men, and it is very little more difficult to plan out a job of ordinary size than one of great magnitude. All work can be divided up into sections or different classes of work, so that the various parts can be planned as would any ordinary job.

It is seldom difficult to obtain capital for a job. First obtain the job and then money can be gotten either from banks or capitalists or else other contractors can be gotten to "go in" on the job. Another method is to do as much work as possible with one's own outfit and forces and then sublet other parts of the work, especially those for which new machinery must be purchased. A contract for a good piece of construction work is always an asset, both for obtaining capital and credit, which for some purposes may be as good as capital.

Contracting has in it certain elements of risk, but there should be no reason why a man should not keep his nerve with him, and no matter what may befall, keep at it and always have nerve enough to expand his business, and have the desire and be on the alert for new worlds to conquer. Nerve is a requisite for contracting.—The Contractor, Chicago.

Standard Specifications on Steel Reinforcement Bars

THE steel bars manufactured in San Francisco by the Rudgear-Merle Company and sold by Messrs. Woods & Huddart of 444 Market street, cover all the requirements imposed by the Association of American Steel Manufacturers. This association has recently made an important departure in issuing standard specifications for steel bars. The specifications issued in 1910 provided that "steel may be made by either the open-hearth or Bessemer process. Bars shall be rolled from billets." In the new specifications, two booklets are issued, one for reinforcement bars rolled from billets, of which the first clause is exactly the same as that of the first clause in the specifications issued in 1910, with the exception that the second sentence of the first paragraph reads as follows: "Bars shall be rolled from standard new billets," the idea being that nothing but absolutely new material will be tolerated. The second booklet of the new specifications applies to rerolled material only or "rail steel concrete reinforcement bars." The rail steel specifications are as follows:

Manufacture.—1. All steel shall be rolled from standard section tee rails.

Physical Properties.—2. The physical properties shall conform to the following limits:

Properties considered:	Rail steel grade. Plain bars.	Deformed and hot-twisted bars.
Ultimate tensile strength, minimum, pounds per square inch	80,000	80,000
Yield point, minimum, pounds per square inch	50,000	50,000
Elongation, per cent in 8 inch, minimum	1,200,000	1,000,000
	T. S.	T. S.
Cold bend without fracture:		
Bars under ¾ inch diameter or thickness	180°d.=3t.	180°d.=4t.
Bars ¾ inch diameter or thickness and over	90°d.=3t.	90°d.=4t.

Yield Point.—3. For the purposes of these specifications, the yield point shall be determined by careful observation of the drop of the beam of the testing machine, or by other equally accurate method.

Form of Specimens.—4. (a) Tensile and bending test specimens may be cut from the bars as rolled, but tensile and bending test specimens of deformed bars may be planed or turned for a length of at least 9 inches if deemed necessary by the manufacturer in order to obtain uniform cross-section.

(b) Tensile and bending test specimens of hot-twisted bars shall be cut from the bars after twisting, and shall be tested in full size without further treatment, unless otherwise specified.

Number of Tests.—5. A complete physical test shall be made, by an approved testing laboratory, of each size of bar to be applied by the manufacturer on the contract from each 10-ton lot or less. Should a test specimen develop flaws, or should the tensile test specimen break outside of the middle third of its gaged length, it may be discarded and another test specimen substituted therefor. In case a tensile specimen does not meet the specifications, an additional test may be made.

(c) The bending test may be made by pressure or by light blows.

Modifications in Elongation for Thin and Thick Material.—6. For bars less than 7-16 inch and more than ¾ inch nominal diameter or thickness, the following modifications shall be made in the requirements for elongation:

(d) For each increase of ⅛ inch in diameter or thickness above ¾ inch, a deduction of 1 shall be made from the specified percentage of elongation.

(e) For each decrease of 1-16 inch in diameter or thickness below 7-16 inch, a deduction of 1 shall be made from the specified percentage of elongation.

Number of Twists.—7. Hot-twisted bars of rail carbon steel shall be twisted with one complete twist in a length equal to not more than 12 times the thickness of the bar.

Finish.—8. Material must be free from injurious seams, flaws or cracks, and have a workmanlike finish.

Variation in Weight.—9. Bars for reinforcement are subject to rejection if the actual weight of any lot varies more than 5 per cent over or under the theoretical weight of that lot.

* * *

A Skyscraper for Business Women Only

PLANS are under way in New York City for what probably will be the first and certainly will be the largest office building in the world to be occupied exclusively by business women. Since the idea was first broached by the projectors of a busines bureau for women the number of applications received for space have multiplied so greatly that serious consideration is now being given to the idea of securing the Madison Square Garden, the city's greatest amusement structure, to be remodeled for this purpose.

The garden occupies an entire block and is held at $3,500,000, but the wealthy enthusiasts behind this newest woman's movement insist that they will have no difficulty in filling a building of this size, providing they can obtain the necessary financial backing for its erection or reconstruction. The new building will contain offices for women doctors, lawyers, real estate dealers, dressmakers, milliners, hairdressers, insurance agents, photographers, publishers, advertising agents and amusement managers, besides studios for women artists and musicians and headquarters for the hundreds of women's clubs and societies that flourish in different parts of the city. A novel proposal is to include a hall where those with new articles of interest to women can exhibit and demonstrate them. A restaurant, run and managed by women, will be a feature, and it is even said that an application for the shoe-shining privilege has been received from an enterprising young woman.

The only man who has thus far ventured to apply for admission is one, who, presumably in a spirit of levity has asked for a concession to collect the hairpins that may be dropped in the corridors and public rooms. Hotels, clubs and apartment houses exclusively for women already are familiar institutions in New York, and with the addition of this great new office building the women of the city engaged in commercial pursuits will be entirely independent of mere man.

* * *

Phwat D'ye Think Oi Am?

Patrick, lately over, was working in the yards of a railroad. One day he happened to be in the yard office when the force was out. The telephone rang vigorously several times and he at last decided it ought to be answered. He walked over to the instrument, took down the receiver, and put his mouth to the transmitter, just he had seen the other do.

"Hillo!" he called.

"Hello!" answered the voice at the other end of the line. "Is this eight-six-one-five-nine?

"Aw, g'wan! Phwat d'ye think Oi am? A box car?"—Ladies Home Journal.

Oil Makes Concrete Waterproof

A CEMENT which will resist water, and which therefore will not crack, appears to have been discovered by Logan Waller Page, Director of the Office of Public Roads, and his associates. This discovery is that mixing a proportion of about 10 per cent of petroleum risidual oil with ordinary Portland cement, sand, and stone or gravel—the familiar concrete—renders the concrete water proof without in the least impairing its tensile strength. The importance of the discovery can hardly be overestimated, for the use of concrete as a substitute for wood and other material has become universal in this country, but the tendency of concrete mixed only with water to crack has been a serious fault.

While experimenting in an attempt to develop a non-absorbent, resilient and dustless road material, one capable of withstanding the severe shearing and raveling action of automobile traffic, the investigations of Director Page led him into this very promising discovery. He found that when a heavy mineral residual oil was mixed with Portland cement paste, it entirely disappeared in the mixture, and furthermore, did not separate them from the other ingredients after the cement had become hard. The possibilities of oil-cement mixtures for water-proofing purposes were recognized and extensive laboratory tests were begun immediately to determine the physical properties of concrete and mortar containing various quantities of oil admixtures.

As an example of a laboratory test showing the non-absorbent and non-permeable character oil-mixed mortar when subjected to low pressure, four mortar vessels 8 inches in outside diameter, 2½ inches high and about ½ inch thick, after hardening in moist air for about one week, were immersed in water to a depth of about 2 inches. A mortar mixture of one part of cement to three parts of sand was used. Vessel No. 1 contained no oil in the mixture. About one minute after immersion a damp spot showed on the bottom of the water-mixed vessel. After one hour the whole vessel was wet, even above the water level, since the water had climbed by capiallarity. Within a few days the water had penetrated the plain mortar vessel until the water level inside was the same as that outside. The remaining three vessels made of 1:3 mortar and mixed with 5, 10, and 20 per cent of oil, respectively, have remained perfectly dry on the inside during immersion for one year.

A service test of the oil-mixed mortar was made in the new vault of the United States Treasury Department constructed in the fall of 1910, a vault 112 feet long by 18 feet wide. The side walls of this vault contain 10 per cent of oil based on the weight of cement in the mixture. The roof was constructed of ordinary reinforced concrete with about three inches of 10 per cent oil-mixed concrete placed on top. For months the roof of this vault was subjected to several feet head of water without showing any signs of leakage.

Another vault in the north end of the Treasury never has been available for the storage of anything of value because of leakage. Oil-mixed concrete was placed on the roof of this vault, and it is perfectly dry at the present time. Numerous floors in the sub-basement of the Treasury building and a floor in the office of Public Roads have been constructed of 10 per cent oil-mixed concrete and have remained absolutely free from dampness. A tank in the Office of Public Roads, composed of one part of cement, two parts of sand, and four parts of stone, mixed with 10 per cent of oil based on weight of cement, along with several other tanks used for various purposes, has remained absolutely water-tight.

It has been shown that the admixture of oil is not detrimental to the tensile strength of mortar composed of one part of cement and three parts of sand

when the oil added does not exceed 10 per cent of the weight of the cement used. The tensile strength of mortar and of concrete suffers slightly with the addition of oil, although when 10 per cent of oil is added, the decrease in strength is not serious.

Concrete mixed with oil requires about 50 per cent longer to set hard than does plain concrete, but the increase in strength is nearly as rapid in the oil-mixed material as in the plain concrete. Concrete and mortar containing oil admixtures are almost perfectly non-absorbent of water, and so they are excellent materials to use in damp-proof construction. Under pressure, oil-mixed mortar is very efficient in resisting the permeation of water. Laboratory tests show that oil-mixed concrete is just as tough and stiff as plain concrete, and furthermore its elastic behavior within working limits of stress is identical with that of plain concrete. The bond or grip of oil concrete to steel reinforcement is much decreased when plain bars are used. Deformed bars, however, and wire mesh or expanded metal will reinforce this material with practically the same efficiency as in ordinary concrete.

* * *

Building Foundations in Quicksand

IN erecting the eleven-story dormitory annex of the West Side Young Men's Christian Association a rather interesting problem presented itself, and that was the building of the foundations in a basin of quicksand through which ran a stream of water. The new building is on West Fifty-sixth street, New York City, and on one side is the present dormitory of the association and on the other a seven-story apartment house. Foundations of both buildings rest on this basin of quicksand, and to excavate for a foundation beneath the level of the footings of these two adjoining buildings meant that the quicksand would ooze from beneath them and both structures be undermined.

In successfully performing this engineering feat, piles were first sunk through the quicksand to bed rock, the piles varying in length from 20 to 45 feet, due to the slope of the rock surface underneath. So treacherous was the quicksand that the piles could not be driven with the ordinary drop hammer, for the reason that the vibration would have a tendency to destroy or injure the adjoining buildings and it was therefore necessary to use a steam hammer having a sharp blow.

There is a swimming pool 20x60 feet in the basement of the new dormitory and to provide for this caused the architect no little concern, as the foundations for the pool and a portion of the pool itself extend below the footings of the adjoining buildings. It was evident that if an excavation was started for the pool the quicksands would fill in as rapidly as taken out. Something rather novel, therefore, in foundation construction was finally decided upon. At the time the piles were sunk a wall of sheet steel piling was driven down all around the lot, thus effectually preventing any movement of the quicksand. Excavation for the swimming pool was then made without danger to the surrounding property, the pool resting on a reinforced concrete bed, which, in turn, is supported by the piles.—*The Building Age.*

* * *

Big Hotel for Occidental Site

Architects L. B. Dutton & Company have been retained to prepare plans for a ten- or twelve-story Class A hotel to be erected on the site of the old Occidental on Montgomery between Sutter and Bush streets, San Francisco. The property has been leased from the Donohue heirs for fifty years. The new hotel will probaly cost close to a half million dollars.

California Mission Style of Architecture Followed in Design for Eastern Chocolate Factory
Sidney B. Newsom, Architect

Concrete in Bridge Building

By FRANK R. McKIBBON

NEVER before in the history of bridge engineering has the influence of public opinion been so noticeable as at the present time; and the interest shown by the public in this important branch of construction is very gratifying, especially to those engineers who have labored unceasingly to have bridges regarded from the artistic as well as from the utilitarian standpoint. Public opinion is now demanding not only that bridges shall be made better, but that they shall be more suited to and expressive of their purposes and environments.

Although great advances have been made in the status of bridge engineering, there is still room for improvement; for it is often impossible to make communities realize that a bridge is something more than merely a means of crossing an opening. They are not willing to make the additional appropriations necessary to secure artistic bridges, even though the structures may occupy such conspicuous positions as to require more impressive and finer treatment than some public buildings upon which vast sums are expended to secure pleasing architectural effect.

A beautiful arch bridge is a wonderful structure. There is something inspiring about it, and engineers must do all in their power to have the public realize this, and appreciate the beauties that can be created by the proper and simple combinations of common materials of construction. Symmetry, grace, simplicity, and truthfulness are essential elements in a bridge possessing architectural merit. Truth is a basic element; and when one material is disguised to represent another, or when a part is made to appear as if performing a certain function when in reality it is performing quite a different one, the result is a dismal failure.

The most remarkable development in bridge construction during the past quarter of a century has been the progress made in the use of concrete, either alone or reinforced with steel. When it is considered that only 22 years ago the first reinforced concrete arch bridge was built in Golden Gate Park, at San Francisco, and that from this small span of only 35 feet to the recently constructed arch span of 321 feet in New Zealand is a tremendous step, it is evident that progress has been truly wonderful.

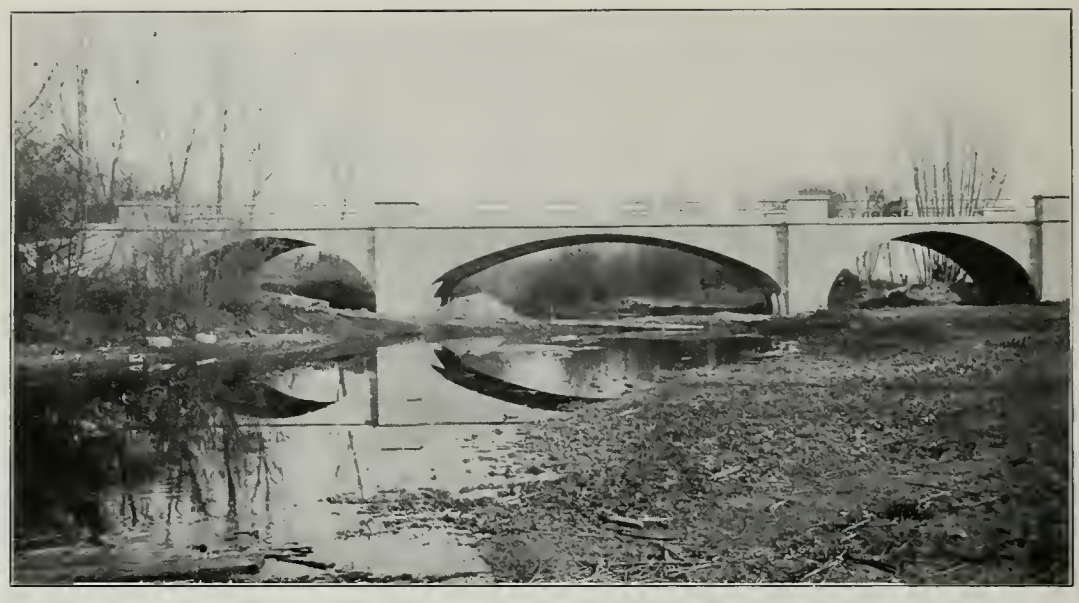
Concrete, like stone, is best suited to resist compressive stresses; and it can be readily moulded into any desired form or size; and it is therefore

A Sacramento County Bridge

Marsh Street Bridge, San Luis Obispo, California *George Story, City Engineer*

Reinforced Concrete Flat Slab Bridge, City of Ross, Marin County, California
John B. Leonard, Engineer

Reinforced Concrete Bridge, Middletown, California *National Bridge Co., Engineers*



Reinforced Concrete Bridge, Santa Clara County, California *Designed by J. G. McMillan, C. E.*

Santa Clara County Bridge, near Gilroy, California *J. G. McMillan, Engineer*

Reinforced Concrete Girder Bridge, City of Ross, Marin County, California

not surprising that when concrete came into use as a bridge material it should have been used in the arch form. It was a comparatively easy change from the stone arch that had been the standard arch form for many centuries, to the concrete monolithic or voussoir arch of similar outline.

But it was soon realized that concrete in combination with steel has a distinct individuality of its own; and hence important changes were made in the form of construction, resulting in the use of lighter structures of more pleasing design and appearance. The constant tendency has been towards the elimination of redundant material. The use of arch ribs, with the variation in size and shape thereof to conform to different classes of loads, or the use of solid arch rings upon which rest column or cross walls to support the roadway above, approaches the design so commonly adopted for arches with steel, and in this respect represents a decided departure from, and improvement upon, the solid arch ring with its superimposed earth fill, which was until recently the standard form of masonry arch construction.

The most recent type of reinforced concrete highway bridge construction consists of a flat deck on which the roadway is placed, the deck in turn being supported by columns or cross-walls resting on a solid arch ring or upon ribs. These ribs are usually rectangular in cross-section, although those of circular form would give a more pleasing appearance, but would be more costly and more difficult to build. Unless the ribs are very wide, they should be braced to prevent lateral displacement under stress. Much can be said in favor of this open spandrel construction, except for very short spans or for spans of small rise, where the old method of bracing the roadway on earth filling retained between longitudinal side walls is better. In the absence of such limitations, however, the open spandrel construction results in a great saving of weight of superstructure, with consequent diminution in size of foundations, and often also in a more pleasing design. For railroad bridges the column-and-rib type has not been adopted, but open spandrels with cross-walls on solid rings are of frequent occurrence.

The Metal Trades Almanak

with

Apologies to Abe Martin and th' Audience

By E. J. FOWLER

Association Notes

One in a long while, you find enough competitors on speakin' terms t' organize an association.

Why is an agreement?

If Prosperity will just return no questions will be asked.

Who ever heard of a Jobbin' Metal Trades Trust?

A business Agent must feel funny when a holiday comes along.

Ther's a reason for ever'thing unless it's an inspector.

After a feller gits through doin' a public job, he reads everything he signs.

Nobuddy ever heard of the pay roll bein' put off because th' man who signs the checks is out o' town.

A sympathizer with your labor troubles is a feller that's fer you as long as it don't cost anything.

Ther's many a slip twixt the order and the final payment.

Nobuddy recovers as quickly as th' feller who sells out on account o' ill health.

Newb Plum has turned in his shop as part payment on his accident Liability Policy and will now start in business anew.

Three Gentlemen were in town yesterday organizin' a new Iron works. One was a machinist, one was a molder, and th' other appeared to be in ordinary circumstances, too.

A terrible accident occurred at the Hocus Pokus Iron Works yesterday, just before noon hour. Th' whistle string broke.

Who wants th' job of walkin' delegate for th' Employers' Union?

If it wasn't for th' gauge and meter trust what great efficiency tests we'd get.

Our wives sometimes ask where'd you get th' Metal Trades Habit?

A Southern California centrifugal pump man on a recent efficiency test would have got 110%; but just then th' belt bust.

Foundry Notes

Smooth-on is alright in its place—Foundry or Society.

A foreman has t' lose about ten straight castings before the boss tellyphones th' customer, "Well, we can't expect to make good ones all th' time."

Who remembers th' good ole fashioned days when plain castings brought six cents a pound?

The odor of burnt core flour and shoe leather can't be counterfeited.

If a "Chinese Pig" could "scrap," how fast would th' "slag run?"

Th' best time to weigh a casting is before th' cores is cleaned out.

Did you ever notice how anxious th' machine shop is to save a casting, when th' machine work is half done?

I wonder who gets all th' big lumps o' coke?

The boss can't flare up and leave like th' cupola man.

A foundryman with clean hands caused considerable comment at th' banquet this evenin'.

It takes only 12 Sunday papers now t' light up th' cupola.

Th' casting with a crooked core don't allus come from th' cheapest foundry.

A Los Angeles foundryman was in town yesterday and says He's pouring most every day now since he got busy by gum.

Pattern Making and Boiler Shop Notes

A new boiler shop has just started makin' boilers by th' correspondence school method.

An inventor is allus just comin' out of a pattern shop.

A feller once said, "Figures don't lie;" but this was before the days of th' popular boiler test.

Wasn't it a snap when th' pattern maker never had time to put on th' last coat of shellac.

Everybuddy thinks they know somethin' about noise until they visit a boiler shop.

What San Francisco really needs is a few more boiler shops.

A "Invoice" allus takes thirty days longer to check up than a bill.

When a shop gets a bid job nowadays th' boss hikes it to the draughting room to see who made th' mistake.

Machine Shop Notes

Th' blow holes never show up until th' finishing cut.

A jobbin' machine shop boss was pinched down on th' flat yesterday fer smilin'.

Grand Dad didn't know nothin' about high speed tool steel, he worked ten hours.

If a feller can't hold his job in any city shop, there is always Mare Island.

A automobile salesman could talk about a pulley just as easy.

Some fellers git credit fer being quiet an' inoffensive when ther' really in th' machine tool business.

Whenever you see a steel casting man and a machinist together, ther' talkin' about blow holes.

Any feller that 'll listen to soft stuff like this orto be in th' metal trades anyway.

*
* *

Like a Barbler Shlop

In New York's Chinatown abides an ancient Chinese gambler with a name so unpronouncable that, by common consent, the white residents of the quarter call him Old Horse and Wagon.

At the time when the Tong wars were raging and Chinese feudists were being shot to death at the rate of about three a week, Old Horse and Wagon undertook to describe the situation to a Caucasian friend.

"Him jlus' like barbler shlop," he said. "Commie in—glettie chleck. Boom!—him glone—good-blye!"—Post.

Apartment House, Stackton, California *Glenn Allen, Architect*

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Will Design Santa Ana School

Architects Withey & Davis, of Los Angeles, have been selected by the board of education of Santa Ana to be the architects of the new polytechnic high school buildings to be erected in that city. Thirteen sets of plans were submitted in the competition and the merit of the drawings showed a great deal of study had been given the problem on the part of the competitors. This is the first competition for a public building held in Southern California according to the rules of the American Institute of Architects and the method of conducting the competition and the results achieved were highly satisfactory to both the board of education and the competing architects.

The accepted design provides for four buildings: administration, academic, manual arts and cafeteria buildings. The style of architecture is purest Grecian. The construction suggested is brick with plastered exterior. The sum of $160,000 is available for building purposes exclusive of furnishing.

In accordance with the recommendations of the advisor the second prize of $100 was awarded by the board of education to Architects Allison & Allison, and the third prize of $50 to Edgar H. Cline. Others who submitted plans were : George F. Costerisan, A. Burnside Sturges, Elmore R. Jeffery, T. R. Griffith, Robert M. Taylor, Train & Williams, A. L. Valk, Homer W. Glidden, Noonan & Kysor, and Frederick H. Eley and Otto Janssen, associated.

Personal

Henry H. Meyers, formerly of Meyers & Ward, has been selected as advisory architect to take charge of the competition for the proposed new Alameda County Hospital group at Oakland.

Architect G. Alexander Wright has started on a tour of the world. Mr. Wright will give Architect and Engineer readers the benefit of some of his observations in occasional letters, and the latter are sure to be read with great interest, for Mr. Wright is a fluent and entertaining writer.

Architect Willis Polk has gone abroad for a few weeks' recuperation.

Charles H. Snyder, who has been the San Francisco manager for Milliken Bros. Company, is now associated with Architects Bakewell & Brown in charge of their Engineering Department.

Architect Arthur T. Ehrenpfort announces the removal of his offices from the Russ building to Room 409 at 251 Kearny street, San Francisco.

W. W. Breite, C. E., of San Francisco, has recently returned from an extended business trip through the Eastern states. Mr. Breite says business conditions are improving throughout the East and Middle West.

Naval Architect Dead

John Haug, naval architect and mechanical engineer, formerly of Philadelphia, Pa., who died recently in Berkeley, won deserved recognition as the result of his skill as a naval architect. He was a native of Germany and served his apprenticeship in a locomotive works there, was subsequently chief draughtsman for a ship building firm in Hamburg which builds tug boats and river steamers; was engaged in a similar capacity in different works in England, lastly under the late J. McFarlane Grey who was chief examiner of the British board of trade, assisting him in the first plans for his steam steering engine to go in the Great Eastern.

As surveyor for Lloyds register in Philadelphia many hundreds of cases of damaged vessels were attended to by him.

Many designs of compound and triple expansion engines for tugs and yachts mere made by the subject of this sketch for J. W. Sullivan of New York. Triple and quadruple expansion engines of all kinds for land and marine service were his specialty.

Haug was a member of the American Society of Naval Architects and Marine Engineers and his passing closed the life of an energetic, successful and useful man. He leaves a wife and two sons, Mrs. Haug being the daughter of Prof. T. S. C. Lowe, scientist and inventor and one of the organizers of the United States Improvement company of Philadelphia, and builder of the far famed Mount Lowe Incline railway in Pasadena, California.

Architect Meussdorffer Busy

Building continues to be brisk with Architect C. A. Meussdorffer, of San Francisco. Contracts recently were awarded for a five story steel frame reinforced brick building on the northeast corner of Pine and Jones streets, San Francisco, for Police Commissioner Theodore Roche.

Plans have been finished for a Class "A" reinforced concrete building for automobile purposes on the northeast corner of Geary street and Van Ness avenue, lot 120 x 109 feet, to cost $85,000. Major C. L. Tilden is the owner.

Bids have been taken for a five-story reinforced concrete hotel building on the south side of Sutter street east of Hyde, San Francisco, for J. D. and Dr. H. G. Richards.

Contracts have been awarded and work begun for a seven-story steel frame reinforced brick hotel building for Mr. Edw. H. Mitchell, on the west side of

Sixth street, 25 feet south of Mission street, to cost about $75,000.

Plans are being completed for Senator Charles P. Cutten for a beautiful residence on Euclid avenue between Palm and Jordan avenues, San Francisco.

James Dix Schuyler

James Dix Schuyler, an engineer of international repute, whose services in consultation capacity have been employed by the United States and many foreign nations, died at his home, 160 Hill street, Los Angeles, early in September last. His death was attributed directly to the fire which raged in the Ocean Park section. Mr. Schuyler had been confined to his house for several weeks, but had been improving until his residence was threatened by flames, and he was compelled to suffer the excitement of hasty preparations to vacate his home.

Mr. Schuyler was born in Ithica, N. Y., 64 years ago, and came to California when 24 years old. His residence for some years was in San Diego, and later in Los Angeles. He was employed as a consulting engineer in the beginning of the Owens river aqueduct project, was an assistant state engineer and had been among the foremost as a builder in California during his entire residence here.

The list of societies to which he belonged is a long one, and includes other than those organized among men interested in technical and scientific subjects. He belonged to the California Club, Union League Club and the Gamut Club of Los Angeles. Shortly before President Roosevelt left the White House he appointed Mr. Schuyler one of a board of seven engineers to report on the feasibility of the Gatum dam and other features in the construction of the Panama Canal. Mr. Schuyler accompanied President Taft on a visit of inspection of the canal. He made such a favorable impression upon the President that the latter conferred upon the engineer the nickname of Victor Cheryble, after Dicken's character of that name.

The governments of Canada, Brazil, Spain, Mexico and other countries have availed themselves of Mr. Schuyler's services as a consultation expert. The greatest hydraulic project on the continent of Asia—that which will provide light and power for the city of Tokio, Japan—was one of the products of Mr. Schuyler's engineering skill.

Notably among engineering problems that he worked out in California was that by which the Great Western Power Company of Northern California has succeeded in furnishing light and power to San Francisco and several other Northern California cities.

Death of Thos. Stent

Thos. Stent, 90 years of age, died at his home in Los Angeles, the latter part of September. He had resided in Southern California nearly twenty years, previous to which he was architect for the Canadian government, and planned many of the large buildings in the Dominion; also for the Astor estate in New York. Some years ago Mr. Stent entered plans for the capitol building in the city of Mexico, which were considered at that time the most complete set of drawings ever submitted in competition. He always attributed his long life to his regular and methodical manner of living.

Machinery Building at Panama-Pacific Exposition

The Machinery Building, which is to grace the 1915 Universal Exposition, will be the largest of the thirteen exposition palaces that are provided for in the plans being prepared by the members of the Architectural Commission, and will be the first contract let for the main exhibition palaces. Four heroic statues, representing the personalities who were greatest in the advancement of mechanical arts—Archimedes, Guttenburg, Watt and Edison, will, in all probability, be placed on this building.

Sacramento School Competition

A COMPETITIVE system of designing the new Sacramento school buildings to be built under the remainder of the $800,000 bond issue was urged by a committee of San Francisco architects before the City Commissioners. The committee disapproves the scheme of employing an advisory architect.

The architects suggested that the Commissioners have an architect prepare preliminary plans covering the number of schools required, estimated cost of each and other data, and that this information be sent to the Competition Committee of the San Francisco Chapter of the American Institute of Architects, which will arrange the details for competition.

A jury consisting of the Commissioners, architects to be named by the Bay Chapter and a disinterested architect, chosen by the jury, would pass on the designs submitted in competition. The architect furnishing the best design would get the work of supervising the school construction. Other prizes in the shape of subsequent school work should be offered, so the San Franciscans thought.

The committee did not approve of an advisory architect for all work, insisting that it would be unprofessional for one architect to pass on the work of another. A competent general contractor would be of more assistance, they argued. It was estimated that fully a hundred architects would compete for the Sacramento work.

On the committee were William Mooser, William B. Faville and Sylvain Schnaittacher. The Commissioners took no action in the matter.

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A COMPLAINT ABOUT CALIFORNIA STATE ROADS

There seems to be trouble in store for the members of the California State Highway Commission who are directing the construction of the new state roads. Three engineers have submitted a report to the League of California Municipalities criticising the material that is being used. These engineers are C. P. Jensen, S. J. Van Ornum and J. J. Jessup, who claim that the wearing surface is much too thin. They profess to have examined carefully the work that is being carried on in San Mateo county. It is claimed that oil macadam is being used, a material that has not been in use long enough to prove its durability. The engineers recommend an asphalt concrete surface.

It will be interesting to learn what the State Highway Commission think of this recommendation. The commission is supposed to be made up of men thoroughly acquainted with road building and it has been supposed that before determining upon a type of construction, the members made a careful inquiry into the different materials, visiting other States and ascertaining from their engineers what class of roads have given best satisfaction.

CONCRETE FURNITURE

Mr. Edison proposes to make concrete furniture. He declares that it can be done at less than half the price of wood. The surface can be polished and stained to look like any kind of wood! Mr. Edison is using a concrete cabinet for his phonographs, and the surface is said to be like enameled wood, colored white and gold. The greater weight is admitted; but, according to Mr. Edison, it would only be one-third greater than that of wood, and he says that he can reduce this to one-fourth. Probably; but we confess the hospitality of a man who asked us to stretch our legs under his concrete dining-table would hardly cement our friendship.

OUR BUILDING DEPARTMENT SHOULD WAKE UP

Our City Fathers do not appear to have learned the lesson of the fire, as is shown by the continued erection of frame buildings in the down town district. The issuance of a permit for such a tinder box of a frame shack as the one going up on Clementina street near Fifth (almost in the center of the down town manufacturing district) is little short of a crime. The time has gone by when such shacks are necessary and certainly the present is not the time to increase the number.

Observations

By BILL WISE

Healy-Tibbitts Shave the Bill

The assessed charge for engineers' inspection of the imperfect construction of the Twin Peaks Reservoir of $2625 has been cut down to $1875 by Healy-Tibbitts Construction Company, which objects to paying for the Secretary's work in drafting his report. The claim is made that this office was filled by the son of the Engineer and is, moreover, excessive.

* * *

A Human Power Plant

As one walks along lower Mission street he is confronted with the startling sign in letters of mammoth size, all on one line, without punctuation:

EUREKA BOILER WORKS WM. J. BRADY

What the Eureka Boiler is working Wm. J. Brady for is not stated—but the sign seems like an appeal for help and succor. Cannot Wm. J. Brady resist the Eureka Boiler or is he compelled to yield to what we must characterize as a bold hold-up? This course on the part of the Eureka Boiler against the defenseless Brady will win it few friends in this city.

* * *

Governor Johnson Sues Moore

Governor Johnson has brought suit against C. C. Moore, President of the Panama-Pacific Exposition, and one H. D. Pillsbury, claiming that he was engaged by them to prosecute certain claims on behalf of the Ocean Shore Railroad, and although his bill was for $3,000 he has not been able thus far to collect but $4.25. Naturally, Governor Johnson thinks that having waited over three years for his fee he should receive a larger sum on account and hence the suit. Perhaps the matter could be compromised by the Governor taking admission tickets to the Exposition for the unpaid balance.

* * *

Provincialism.

The St. Mark's Hotel fire, in Oakland, revealed the fact that the use of automatic sprinklers is almost unknown on the other side of the Bay. The City Hall, the Oakland Hotel and other large structures in Oakland are without these valuable auxiliaries in fire prevention. We presume that our Oakland friends will not use so necessary a protector until one of its citizens has invented a sprinkler device and an Oakland factory is manufacturing same. If this narrowness continues we shall soon have to change the slogan to "Oakland for the Oldganders."

* * *

Criticism of the Berkeley Exposition.

While any meeting of Municipal Leaders must be fraught with interest and all exhibits of machinery and appliances have real and practical value, yet it is to be regretted that any suggestion of "private gain" should be allowed to creep into a Convention and Exposition which should be managed in a public spirited manner. The recent "Public Welfare Exposition" is quite severely criticised by the exhibitors on the following grounds:

1. That while the Berkeley University freely gave the use of their buildings and grounds, yet the exhibitors were obliged each to take one or two pages (at $50 per page) in the Exposition number of a privately managed magazine.

2. The exhibitors were requested to patronize the "Official Decorator," who charged, as one exhibitor phrased it, who paid $300 for the decorations of his booth, "just twice what an outsider would have done it for."

3. Music was promised and yet all the bands were paid for by private contributions or by a levy on the exhibitors.

4. The attendance was estimated by the "promoter" at "fully 50,000," and yet 5,000 would cover the full week's attendance outside of the local people. The delegates, instead of the assured 750, numbered 150.

5. While it was announced that an admission would be charged, yet this was not done, and the exhibitors who so graciously gave out "passes, not transferable," had the laugh turned on them of bestowing something of no pecuniary value.

State, County and Municipal Engineering

Good Roads—Water—Sewers—Bridges—Fire Protection

The Public Welfare Exposition

AN exposition of considerable technical value was held September 23-28, 1912, in California Hall, Berkeley, in connection with the conventions of the League of California Municipalities and the California State Board of Health. The League of California Municipalities which represents 147 cities, is divided into three departments which held separate sessions in the mornings, all convening together in the afternoons.

These departments are as follows:

1. The Department of Engineers, Councilmen and Street Superintendents.
2. The Department of Attorneys.
3. The Department of Clerks, Auditors and Assessors.

The president, Hon. A. E. Dodson, said in part at the opening of the convention:

"This league is composed of officials whose business it is to consider the welfare, comfort and safety of their respective communities. The object of these annual gatherings is to exchange ideas and experiences with each other, and to co-operate in securing such state legislation as may be found desirable.

"While the consideration of the tax rate is an important duty for a city official, this is not the only object to be accomplished. Private or public corporations are usually conducted for profit, but a municipal corporation is not. Its duty is to consider the health, comfort and safety of the inhabitants, with the least cost commensurate with good government. It is not the administration that can show a low tax rate that should be preferred over one that can show good results from a reasonable tax rate.

Fire Protection

"While this league has given the question of fire waste considerable attention in the past, it appears to me that it would not be inappropriate to add another department to especially consider the matter of building construction, oil storage, control of combustible matter, fire waste and fire fighting. The fire waste of this country is enormous, and primarily a very large per cent is attributed to the class of construction of buildings and failure to enforce ordinances intended for prevention of fires.

State Highways

"As the state has appropriated the sum of eighteen millions of dollars for construction of state highways, it is to the interest of every Californian that this money be judiciously expended and the best possible construction obtained. This especially interests the municipalities of the state, as they pay about 70 per cent of the expense of such highways, although not a mile of it is to be constructed within their limits.

"Millions of dollars have been expended in roadmaking experiments in California, and these experiments have demonstrated that certain methods are successful and others uncertain or possibly complete failures. We cannot afford to experiment further, and we feel this body can do no less than urge the highway commission to build only the very best construction, even if some portions must be left incomplete for want of sufficient funds."

At the opening session brief reports from the various municipalities represented were given and these showed some interesting statistics:

Azusa reported cement walks and curbs and oiled streets constructed; Burbank, which has been a city but fourteen months, has done much street work and has sold an electric light and gas franchise to two corporations, and Coalinga reported $40,000 spent in sewer extension and $125,000 in paving.

Aetna is a small city in the north, with a fine climate and, when the sewer system which is now projected is completed, will have real claims to a health resort; Fresno is to build a large hall, to be known as the Rowell Auditorium, in honor of the late Chester Rowell, and Glendale has cut in half its electric-light rates, besides expending $125,000 in street work. Gilroy is to spend $40,000 in street paving and is rich in experience from municipal ownership of public utilities.

Kingsburg has done a lot of street paving. Livermore has organized a labor improvement club. Long Beach con-

templates $3,000,000 expenditure for a horseshoe pier, has expended $25,000 in renewing the present pier, done sixteen miles of paving, has opened the port to the commerce of the world and today will vote $100,000 for a new pier. Monterey is installing a septic tank for its sewer system, and Napa is to spend $110,000 for a sewer system.

Oxnard will put in $130,000 for a water and light system and is fighting the present privately owned companies in these utilities. Palo Alto has reduced the tax rate to 95 cents on $100, will extend its water plant by the expenditure of $50,000 and has reduced the cost of electric power and gas nearly one-half.

Redlands has voted $600,000 for a municipal water system and claims a flyless town. San Diego has a million-dollar harbor and will spend $2,000,000 in putting in an adequate water supply. San Francisco claims the change of administration as the most important event in the last year, but also remarks that the appropriation of $8,800,000 to further the civic center idea in building the City Hall and acquiring more land is an important feature of the year.

Santa Barbara has spent $150,000 for a water system. Santa Monica has $350,000 for a polytechnic school building, has new auto fire trucks, thirty miles of paved streets at a cost of $500,000, extended its sewer system, has a commission form of charter and has made additions to its City Hall and Jail. Santa Cruz has established a yard, where all city work is done at cost; has remodeled the City Hall, has motor fire apparatus and is to open a large area of streets in the near future. Santa Maria comes to the front with $75,000 for completing its sewer system, has reduced the gas rate and has an auto fire truck. Santa Ana has completed a reservoir to hold 8,500,000 gallons of water, will soon complete an outfall sewer at a cost of $125,000 and has paved many miles of streets. Sierra Madre has completed paving twelve miles of streets and has spent $50,000 in acquiring water pipe from a private company.

San Bernardino tells of street paving, extension of its sewer system, installing an auto fire truck and reducing its fire rate one-third. Tulare has spent $110,000 in improving its water system and has done other smaller things during the year. Willits has turned over the control of fixing rates of its public utilities to the Board of Public Utilities of the State, as all its public utilities are corporation owned, and Alhambra has spent $175,000 on its City Hall and Library, has better fire protection and proposes an incinerator in the near future. Berkeley proposes a municipal water system for seven towns in co-operation, has an incinerator projected, has acquired an auto police patrol and will extend its police and fire alarm system. Colton has done much street paving and extended its water system, while Burlingame has spent $75,000 on sidewalks and curbing and $175,000 on a municipal water plant.

Light Traffic Pavement

W. M. Frickstadt, assistant street superintendent for the City of Oakland, read a paper by W. J. Bacchus, street commissioner of Oakland, which was in part as follows:

"In the city of Oakland we have adopted oiled macadam for light traffic thoroughfares. We once used simply macadam for such streets, but we found that this pavement was rendered unsatisfactory by increased traffic, especially by automobiles. In seeking a new pavement, we found that asphalt is far too expensive. Oil macadam and surface oiling, however, which we have employed, have been both economical and efficient.

"The oil macadam is used only on new construction work, the surface oiling on streets already constructed. The surface oiling system can be applied only when the street is in fairly good condition, or at any rate can only then be utilized to advantage. In both surface oiling and oil macadam work, heavy road oil is used. It is found that they are very economical in contrast to other methods, since they entail a saving in water, in repairs and in cleaning."

No patent pavement was as good as oil macadam or could be laid as cheaply according to the experience of Oakland, and the thirty miles of this construction which has been put in was proving entirely satisfactory. If no repairing has to be done to the pavement before starting oiling, the cost comes down to an average of 6 cents.

In building oil macadam the cost, as found in Oakland, is from 1½ to 2 cents per square foot more than for ordinary macadam.

Mr. Bacchus, included in his paper a comparison with other systems of light traffic pavements in regard to cost and efficiency. His conclusion was that the use of oil macadam and surface oiling is justified in economy and service given.

Edward Baker, street superintendent of Pomona, read a paper by Clarence E. Bayley, which advocated the use of cement concrete for paving purposes in streets where the traffic was not especially heavy. Although the cost of Portland cement is high at present, the speaker prophesied that with the opening of the canal a great reduction in cost would be made. He also advocated the use of reinforcing screen or mesh in constructing these pavements.

Mr. Frickstadt was followed by H. S. Griswold, instructor of sanitary engineering in the University of California,

who spoke upon "The Purification of Sewage by Dilution." The speaker took up the subject with special reference to the inland streams. After a discussion of the composition of sewage and of its decomposition, the importance of the question of sewage disposal all over the United States was considered. As a method of clarification, the screening of sewage was suggested as the best settlement of the problem.

The concluding speech of the afternoon was upon the subject "Improvements in Public Health Administration in California" by Harold Farnsworth Clay, specialist in sanitation. The speaker dealt mainly with the progress made by California municipalities in the line of sanitary conditions and health appliances.

At the civil engineering testing laboratories demonstration tests were held under the direction of the civil engineering department of the university, assisted by testing engineers resident in the Bay region. The tests made were of structural materials, comprising cement tests, sand tests and concrete rock tests. A short paper upon the subject, "Comparative Strength of Pavement Bases," was presented by B. Gester.

Garbage Incinerators

The three days' sessions had some interesting occurrences including a lecture on "Garbage Incinerators," by J. J. Jessup, city engineer of Berkeley. The lecture was illustrated profusely with views taken in this country and in Europe, which showed various incinerators in operation and their position in the midst of residential and business sections.

The fourth day's proceedings comprised an address by Dr. Donald Currie, of the United States public health service of San Francisco. Dr. Currie spoke upon "The Commercial Exploitation of Disinfectants and Fumigants." The speaker represents the service which has done the most towards standardizing germicides.

Following Dr. Currie, the subject of germicides was taken up by Dr. Wilbur A. Sawyer, director of the bureau of the hygienic laboratory of the California state board of health. The speaker pointed out that so far in this state all the action against inert germicides has been through education, since no legislation has been made forbidding them in California. However, through this process of educating the people had resulted, he said, in controlling the sale of inert germicides, that is, those with little or no germ killing power, and in limiting to some extent the manufacture of these disinfectants and fumigants. Regulatory legislation will probably be passed in the near future, commented Dr. Sawyer, but while it does not exist the campaign of education by health officers should be kept up.

During the same day, beginning at 7 o'clock in the evening, moving pictures associated with the general subject of hygiene were shown by the West Disinfecting Company, of New York, the explanation of same being made by Mr. Peter Dongan, their California Manager. The pictures dealt with such subjects as sanitary problems, disinfectants, sewage treatment and disposal, etc.

At the concluding exercises a report was made by Mayor Wilson, of Berkeley, looking toward a Municipal Exhibit and Congress to be held in 1915. He stated that the matter had been well received and that ambitious plans were afoot for a building to house such exhibits. The same committee was continued for another year to go on with this work.

The election of officers for ensuing year resulted in the choice of Mayor Frank K. Mott of Oakland as president, mayor George W. Stone of Santa Cruz was chosen first vice-president and Frank Ay of Santa Ana was elected second vice-president. H. A. Mason of San Francisco was re-elected secretary of the league.

The general opinion was favorable to the benefits derived from the interchange of ideas.

"This is my fifteenth year of attendance at these conventions, and this is the best of all," said H. A. Mason, secretary of the League of California Municipalities. "In fact, each succeeding convention has shown improvement over all previous meetings."

Some of the Interesting Exhibits

Especial attention is justly given herewith to some of the displays:

H. W. Johns-Manville Company

This exhibit dealt especially with their well-known line of Asbestos Materials, including Asbestos Roofing, Asbestos Shingles, Asbestos Picture Booths, Asbestos Pipe and Boiler Insulation, etc. Also, a special display was made of their Audiffren Refrigerating Machine, an ice making or refrigerating device both simple and economical, and suited to hotels, clubs, hospitals, residences, creameries, cafes, dairies and butcher shops.

Enterprise Foundry Company

The exhibit of the Enterprise Foundry Company was the center of an interested crowd during the entire week. Mr. Kapek, the genial sales manager, was indefatigable in describing the various devices for contractors' use. The Planetary Mixer was, perhaps, the most striking of their specialties and this concrete machine was crushing away almost continually. Then, their new Pulverizer was shown for the first time. This

device is equally well suited to be a cement mill, a dry or wet pan in pottery works, a putty chaser, or for pulverizing any other products. Besides these machines, a large variety of steel, iron and brass castings were shown, including ventilators, cleanout doors, sidewalk boxes, sash weights, etc.

CALIFORNIA CORRUGATED CULVERT CO.

One could not look upon a delegate to the Convention without viewing a specimen of this company's product, which enclosed the delegate's name on the official badge. Also, at this same booth, Venice was being boomed for next year's Convention, and as Venice won, why it stands to reason that this is another strand in the chain of success which has attended the Pacific Coast business of the California Corrugated Culvert Company and the American Rolling Mills Company.

THE BARBER ASPHALT PAVING COMPANY

This Company had a most attractive display of their Genasco Ready Roofings and Waterproofings. Also, the products of their allied concern, the Iroquois Iron Works, were shown, which included Portable Asphaltum Plants, Macadam Road Rollers, Concrete Mixers, Surface Heaters, Sand Dryers, etc.

PARROTT & CO.

This well-known firm had an extensive exhibit, covering their Collins' Interlocking Wireless Studding, "Ceresit Waterproofing," "Chicago Mixer." During the last days of the Exposition they had installed a Smith Hot Mixer, by which the asphalt is placed on the roadway before it cools. Their "Clyde-Grade" Hoisting Derricks and Engines and the Gravity System of Delivering and Placing Concrete, made by the Concrete Appliances Company of Los Angeles, enlisted considerable attention from Engineers and Contractors.

THE FOOTE PAVING MIXER

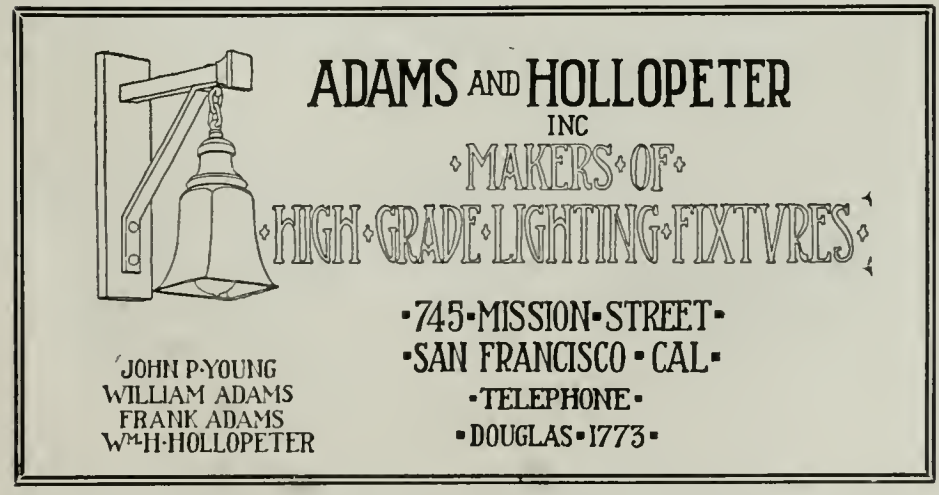
Was shown by Langford, Bacon & Myers, who demonstrated its qualities as a modern and economical machine for the laying of concrete pavements and being now in daily use by many of the leading street paving contractors.

GLADDING, McBEAN & CO.

Confined themselves to an exhibit of their Vitrified, Salt-Glazed, Sanitary Sewer Pipe, the kind of pipe "that stays put."

COLONIAL WALL BOARD

An exhibit of Colonial Wall Board was of interest, as it was a new product which had enlisted warm praise and was of home manufacture, the factory being at Emeryville, Cal. This Wall Board is made of calcined gypsum fibered with wood on a plaster and cement base, and unlike other Wall Boards has no paper covering. It can be waterproofed. The boards can be nailed directly to the studding, furring, joints and beams and will not separate from the plaster coat under the influence of heat or water. It is an insulation for electricity and a substantial fire retardant. Lieut. McKenna, the Cement Gun Operator at Fort Mason, writes: "The Colonial Wall Board is the only thing that will make the cement gun a successful builder." F. O. Engstrum Company of Los Angeles say: "We find it to be a very satisfactory material." Mr. Owen of the Owen Apts., Oakland, writes, Aug. 6, '12: "It has given perfect satisfaction as to its sound-deadening, fireproofing and damp-resisting qualities. I contemplate building another large apartment house in the near future and will certainly use this same material exclusively



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SURETY BONDS AND CASUALTY INSURANCE
Telephones: { Sutter 2750 / Home C 4482 ROBERTSON & HALL, Managers First National Bank Bldg. SAN FRANCISCO, CAL.

for both exterior and interior construction." The Colonial Wall Board and the Colonial Plaster are controlled by the Mound House Plaster Company, whose offices are in the Monadnock building, San Francisco.

N. CLARK & SONS

As opposed to Gladding, McBean & Co., showed a vitrified, salt-glazed sanitary sewer pipe which was claimed to be "the only perfect material for sanitary sewers." We confess it was a bit confusing to listen to Mr. Henry Kiersted, for Gladding, McBean & Co., and then turn to Mr. Scott Elder, for N. Clark & Sons. As one contractor expressed it, "Either one of them is good enough for me."

THE STANDARD OIL COMPANY

With so much of their Richmond Road Oil in evidence on Oakland streets, it seemed to be an easy matter to convince the visiting delegate. The high-grade the uniform product, its prompt delivery, its guaranteed efficiency and durability were urged with convincing power both at the booth and by the unprejudiced speakers at the Convention itself.

THE FESS SYSTEM

This well-known Oil Burner was demonstrated as not only showing the economy of oil itself as a fuel but also the superiority of this type of rotary burners for power and heating purposes.

THE DAHLSTROM METALLIC DOOR

This exhibit of Hollow Metal Doors, Trim and Metal Casement Windows, manufactured in steel, brass, bronze or copper, elicited favorable comment from the Municipal officials. They all seemed to agree with Chief Croker's opinion that it was folly to put up a steel frame building and then install wooden windows, doors and trim for the fire to feed upon.

THE JUDSON MANUFACTURING CO.

Had an interesting exhibit of Bar, Plate and Structural Iron, showing the ability of their plant to furnish any structural material required from a rivet to a steel frame of 5000 tons.

THE PARAFFINE PAINT COMPANY

The Paraffine Booth was voted as one of the most attractive in the Exposition and was constantly crowded with visitors. Besides their well-known Malthoid Roofing, an attractive showing was made of "Amiwud," a wall board which is an interior finish for buildings, giving a hardwood, panel effect replacing plaster and wood for covering the walls.

ROEBLING'S EXPANDED METAL LATH

This standard and well-known Metal Lath was shown by the Roebling Construction Company and its adaptability for exterior plastering was demonstrated. As many building contractors visited the Exposition this exhibit was in line with the interest shown in all materials affecting fireproof construction.

Anything Electrical

The Butte Engineering Company of San Francisco has recently published an attractive brochure illustrating and describing the assorted line of special electrical apparatus manufactured by the company. They have their own plant and machinery and are in position to turn out most anything in the electrical line from electric radiators and fountains to tower bell strikers and automatic gate openers. These special pieces of apparatus are manufactured and installed in addition to the company's regular electrical contracting business.

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HEATING AND LIGHTING

Plumbing and Electrical Work

What Next in Spectacular Lighting?

The use of electric lamps to trace out decorative devices, or to outline the architectural features of a building for spectacular effect, reached a state where new and original adaptations would be welcome. While the effects produced are none the less beautiful in themselves than when they were first blazed forth to an astonished world at the World's Fair in Chicago, they have become familiar and trite, and nothing is spectacular no matter how gorgeous or originally startling that is familiar. Novelty is an absolute essential to spectacular effect. If a building burned down every day within our block it would very soon cease to be anything but a bore.

The effects producible by the flasher have also become common through familiarity. The question of how to produce a genuine spectacular effect with electric light is now a serious and difficult one; serious for those who desire to use it, and difficult for those who have it to produce. What can be done to produce an entirely new vision? What new combination of old principles is possible? How can the recent improvements in electric lamps be impressed into the service? The solution of these problems is a prize worth working for.

We are to have an international celebration in San Francisco three years hence. It offers enormous possibilities for spectacular illumination, and anything of novelty and beauty will certainly be most eagerly taken up by the management. Here is an opportunity for the genius to blossom. It is none too soon to put your thinking-cap on. Let us show the world that we have originality.—Illuminating Engineer.

Lamp Signals for Hotel Maids

New applications for electrical energy are each day coming into use more and more. Now comes the lamp signal for hotel maids, as set forth in the Electrical Review and Western Electrician.

An elaborate system of lamp signals for locating the housemaids who care for guests' rooms is in use at the Hotel Radisson, Minneapolis, where the office staff find it of the greatest service in communicating with the various floors. In every corridor at the side of the door of each guest-room is a small 2-c.p. incandescent lamp, and on the wall below is a flush-plate contact jack into which on entering the room the maid inserts a plug carried on her key ring. With the plug in place the little lamp over the door is lighted, indicating from any point in the corridor in which room the maid is working. The circuits from these door lamps are in turn grouped in a signal board in the hotel office, so that the lighting of each room lamp in indicated by its corresponding lamp on the annunciator board. If a certain room is to be made ready on short notice, the maid on that floor can be reached by noting in what room her lamp is burning and then calling the corresponding number over the telephone.

Cause of Failure in Warm Air Furnace Heating

"In more than three-quarters of the cases of warm air furnace heating on which I have been called," states a Calgary, Can., heating engineer, "where complaints have been made, a handkerchief laid over the register pulled in instead of bulging out with the flow of

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warm air, showing conclusively that the furnace was hungry for air and naturally robbed the coldest rooms—the castings red hot, the cellar overheated and the rooms cold. Result: The owner condemns the furnace as no good. The first mechanic that comes in says that the house cannot be heated by warm air and plugs for a steam job. And why? Because the steam boiler manufacturers in order to get a market for their goods have been instructing the fitter, the plumber and the hardware man how to install the plant, having been given them the fundamentals for computing pipe sizes and the requirements of piping. Consequently the mechanic is on surer ground as to possible results in the case of steam. In the case of warm-air heating, how different! The manufacturer simply put a furnace on the market, in some cases he will claim that it will heat a certain number of cubic feet, in other cases not. No attention whatever is paid either in instructions or otherwise concerning piping or method of setting. He, the manufacturer, has never before interested himself in the results, and the results have never interested themselves in the manufacturer or his goods further than to condemn them."

German Concrete Radiators

An item in The Architect and Engineer for August stated that concrete radiators were being experimented upon in Germany with apparent success. This new type of heating apparatus is shown in Popular Mechanics, with the comment that the radiators are formed by pouring a mixture of cement and sand into special gypsum molds, or iron castings, and can be made in all colors and shapes. The thickness of the walls is about ⅜ inch.

"The most important feature of these radiators," says the writer, "has to do very intimately with hygiene. Being porous, they furnish moisture as well

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as heat to the air in a room." The low cost of construction is also emphasized.

At recent hygienic exhibitions in Germany, it is stated, concrete radiators were shown in many forms and colors.

Cheaper Light Means Larger Use

The fact stated above is only a special case of a general law. Within certain limits the cheapening of any commodity will always increase its use. There was much fear expressed, or felt, when the tungsten lamp first made its appearance that the reduction in consumption of current would mean a proportionate reduction in revenue to the central stations. While there was a readiness to accept the principle above stated as a general proposition there were doubts as to how the theory would work out in practise. Events have proven that the theory held good in this as in other cases. Americans are not small economists; they dislike trouble and wear, and will pay liberally for relief from these evils. To need to have it on one's mind to chase around the house and turn out electric lamps the moment they are not absolutely needed is not conducive to cheerfulness. Furthermore, there is a rapidly growing appreciation of art, especially in reference to the home. The artistic treatment of illumination invariably means waste of light, or rather we should say the use of light, for it is not waste if it accomplishes a desired end. The bare, glaring electric bulb which had been an offense to the eyes, as well as to the mind, could well be replaced with the more artistic and far more comfortable decorative globe or shade which hid the lamp and softened its rays.

The latest refinement in the tungsten lamp opens up still another channel for the greater use of light. This is the 10-watt lamp. When the people understand that a 10-watt lamp means about one-sixth of the current that they once used in the ordinary 16 c. p. bulb they will make liberal use of them for continuous night burning in hallways, bathrooms, porches, etc. Give the American a little time to think and he will always find a way to spend in some new direction what he has saved in another. And this is well. What is economy if not a wise use of money? Let the scientists continue their search for more efficient light-sources, and the manufacturers their efforts in placing their discoveries on the market as cheaply as possible. It will all come out for the best in the end.—Light.

Record Sale of Mixers

Manager J. O. Ernsberger of the Lansing Co. reports having established a record within the last few months in sales of high class concrete mixers in San Francisco and vicinity. Several carloads of these machines have been received by the local office and all have been placed in the district around the bay within a few months.

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By the Way

Some Industrial Information Worth the While

Some New Books

"Building Structures in Earthquake Countries" is the title of a book just published by the J. B. Lippincott Company of Philadelphia, and which ought to interest California architects and engineers. The author is Alfredo Montel, who says in the preface:

"In this little work I mainly deal with the problem of building houses which are proof against earthquakes, and in so doing have made special use of some important works on seismology by Professor F. Omori of the University of Tokyo.

"Above all, I have paid attention to the construction of houses in brick and reinforced concrete. The calculations are purposely expressed in such a way as to facilitate their application in analogous cases.

"My inducement to write this book has been the recent disastrous earthquake in Calabria and Sicily. In these countries, which so terribly suffered under the misfortune, it is in the highest degree desirable that in the work of rebuilding greater foresight and more scientific methods shall be used than has been the case in the past."

The book is sold for $3 net, express prepaid.

A Book on Elevator Shaft Construction

"Elevator Shaft Construction," is the only work published on this subject that we know of. The author says about it:

"In preparing this book, it has been the object of the author to present the subject treated in such a manner as to make the details of practical value to an architect builder, or a building superintendent representing either, having a general knowledge of the work in and about elevator shafts.

"The principal aim and purpose of the work is to emphasize the necessity of the co-operation of all parties connected with the work of elevator shaft construction and elevator installation to produce the best results and necessary economy. The articles on elevator shaft doors and machine rooms contain information

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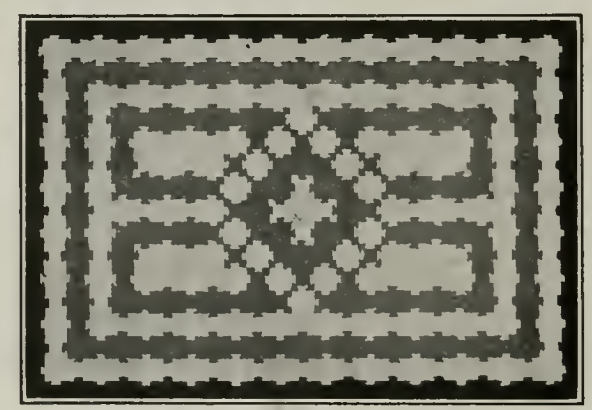

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which it is hoped will be highly useful to architects in preparing their plans. It has always been, and still is, a difficult problem to determine the height of an elevator shaft bulkhead. The article pertaining to this subject has been made quite comprehensive, and the plates conform to the requirements of existing municipal regulations."

The book is published and sold by the Wm. T. Comstock Company, 23 Warren street, New York.

The Value of Surety Bonds as Demonstrated in the Case of Hoyt Bros.

JUST how valuable an asset a surety bond is to owner, contractor and architect has been demonstrated recently in a settlement of the affairs of Hoyt Bros., the well known Santa Rosa and San Francisco contractors. The firm was under bonds, carried with the Massachusetts Bonding & Insurance Company, the California department of which is in charge of Messrs. Robertson & Hall, First National Bank Building, San Francisco. When the banks declined to advance the contractors any more money to meet their obligations, the surety company stepped in and proceeded to complete the construction work which the firm had under way. Just how successfully this work has been carried out is outlined by Mr. Robertson of the Bonding Company, in a statement to this magazine:

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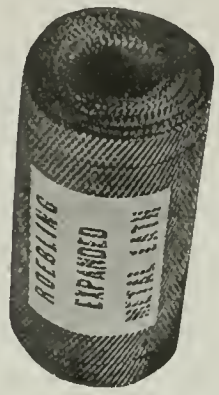

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"The writer had known these contractors for upwards of eight years, during which time he wrote their bonds in the successive companies he has represented and they always paid their bills and seemed to handle their work in good shape.

"Our confidence in them was further increased by the fact that they were spoken of in the highest terms by Mr. Chas. D. Barnett, an old time resident of Santa Rosa, fully conversant with business conditions there and a director in one of the banks; also by the fact that the Santa Rosa National Bank had, for many years, furnished certified checks for Hoyt Bros. without any question and when applied to for information, without qualification, endorsed them as in all respects responsible and able in their line.

"It was, therefore, a very great surprise for us to be advised one Sunday night that the Santa Rosa National Bank had applied a $19,300 deposit toward the satisfaction of the indebtedness of Hoyt Bros. to that bank, giving as the reason or excuse that the Bank Examiner had instructed the bank to close out the Hoyt loan.

"It is, undoubtedly, a fact that the officers of the Santa Rosa National Bank knew that the $19,300 on deposit in that bank had been paid on account of labor performed and materials furnished on the then current contracts of Hoyt Bros., and applied it with a disposition to skin the other creditors.

"At the time Hoyt Bros. failed, they were working on three contracts: the Weber Grammar School at Stockton, the High School at Gilroy, and the Mark Lally Warehouse at Second and Tehama streets, in San Francisco.

"As soon as we recovered from the shock of the failure, we got busy and arranged with MacDonald & Kahn, the general contractors, to complete the Lally Warehouse, which will, probably, net a loss to the company of about $4000.

"After taking many bids we arranged with Mr. Burt Owsley to complete the High School at Gilroy, which will probably net a loss to the company of $10,000, and we made a contract with Frank M. Garden & Co. to complete the Weber Grammar School, at Stockton, at a net loss of probably $11,000.

"Always one of the most difficult things to arrange on a defaulted contract is the matter of paying claims of material men. This is especially the fact where such material men and contractors have had running accounts extending over a number of years and probably over a dozen or more contracts. The question arises as to how much of the bill submitted was for material which actually entered into the construction of the building and whether or not any of the money derived from payments on the particular building, then under construction, had been applied for material entering into construction of other buildings.

"In these Hoyt cases our home office at Boston very promptly authorized us to arrange for the completion of the buildings, but was somewhat reluctant to authorize us to pay material claims without securing absolute evidence that the bills submitted were actually for material going into these particular jobs.

"When the material men commenced to file their bills with us we explained to them what our situation was and that as soon as they would furnish absolute evidence of the correctness of their bills

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that we had no disposition to delay them as to payment of money actually due, but that we would, in consideration of the fact that we were losing money and advancing money, expect such material men, as could afford it, to make some discount from the face of their bills. In many cases material men were glad to meet us on this basis, and in many other cases the material men were perfectly willing that we should hold the sack and pay dollar for dollar irrespective of the fact that we were facing a loss of between $25,000 and $30,000.

"We believe, however, that the action of the company respecting the settlement of these claims has been prompt, fair, consistent, and have no hesitation in saying to owners and others requiring surety bonds that they will get an absolutely square deal from the Massachusetts Bonding & Insurance Company.

"In further proof of this the writer might state that he was present at a meeting of the directors of the company, in Boston, in July, when these Hoyt losses were considered and it was the unanimous opinion of the board that the company should get under these contracts, and settle anything justly due under the terms of the bond, as promptly as possible."

To Erect Splendid Plant

The West Coast Kalsomine company, which has been operating a manufacturing plant for the making of kalsomine, cold water paint, and kindred products, at Nobel station, on the Dupont Powder Company's plant, has purchased the Stauffer Chemical Company's property at the foot of Grayson street, on the Southern Pacific track in Berkeley, and will erect a large and fully equipped up-to-date plant for the manufacture of these products.

The West Coast Kalsomine company has the only factory of this character on the Pacific Coast, and its business is increasing very rapidly. The company is entitled to the support of the people who believe in home industry. Factories of this kind are an asset to the community.

Sent Free To Architects

The United Electric Company, Pacific Coast agents for the "Tuer" Vacuum Cleaners, (office in Rialto building, San Francisco), have issued a morocco-bound volume which they call "No. 2" in their educational series. The standard Engineering Hand Books are deficient in many matters affecting "Vacuum Losses" and "Air Velocity," and the tables contained in this volume could well and profitably be pasted in all copies of Kent, Trautwine or Foster for permanent preservation. The volume has no reference to any type of a cleaner and is an unbiased treatise of educational and practical value.

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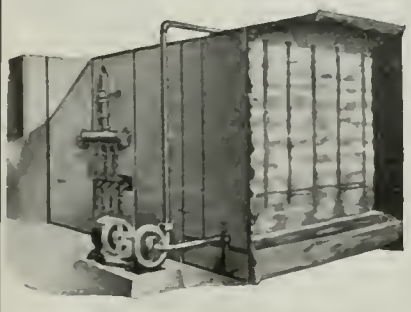

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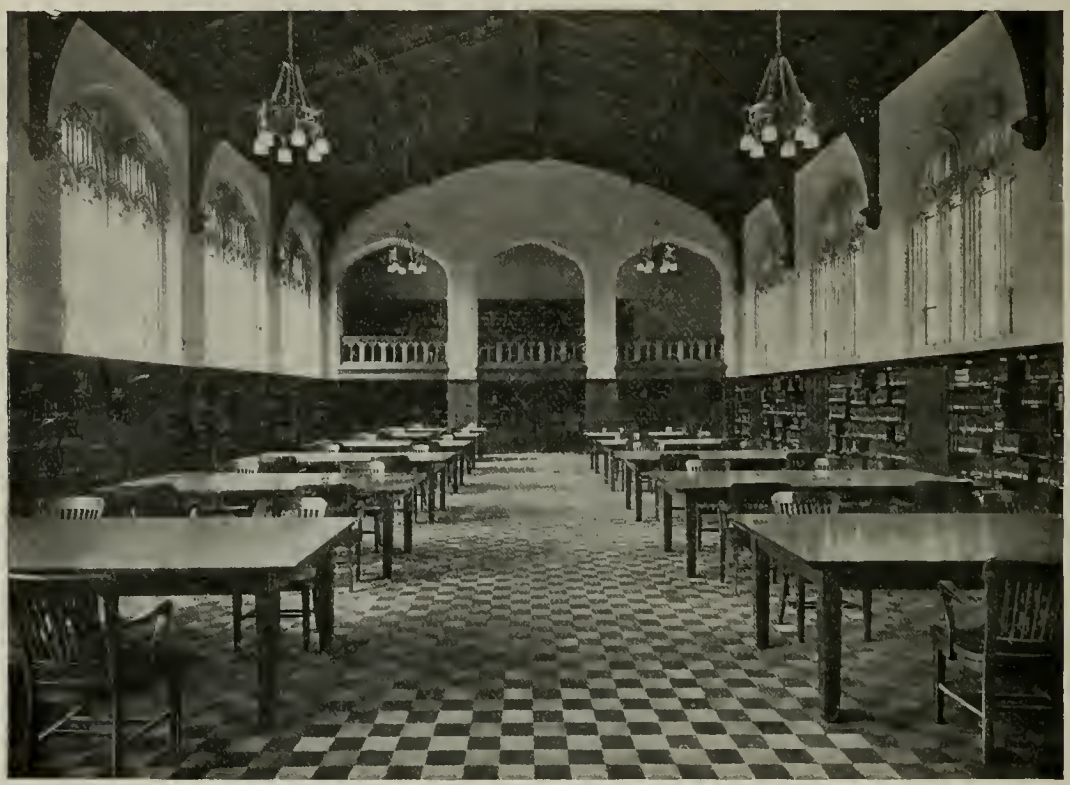

Reference Room, Union Theological Seminary, New York. Allen & Collens, Architects

Nonpareil Cork Tiling is used in this room primarily because of its silence to the tread and its permanent elasticity. The floor has been treated architecturally to correspond with the artistic character of the balance of the work. As each tile is laid separately and individually, the construction of the floor is obvious, and therefore distinctly architectural.

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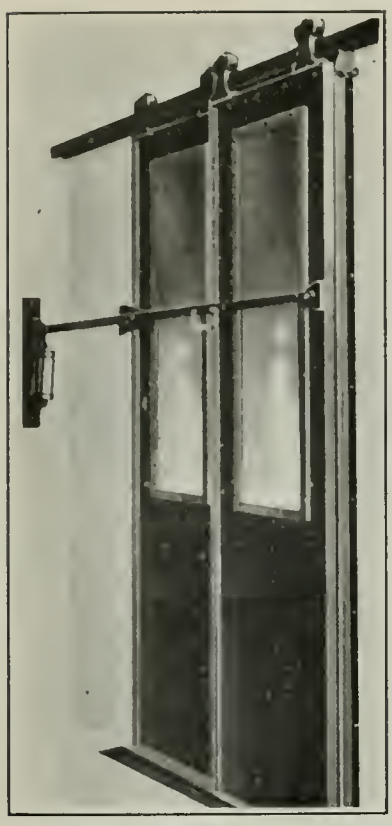

The Norton Elevator Door Closer

THE Norton Elevator Door Closer automatically closes and locks the door and prevents slamming.

The operator opens the door in the usual manner and the Norton device noiselessly completes the operation of closing and locking it.

As shown in the illustration, when the door is closed the levers are in a straight line, thus making the most effectual lock and eliminating the usual projecting latch that so often catches passengers' clothing.

The Norton Elevator Door Closer is applicable to every type of door. Estimates covering the complete installation will be cheerfully furnished. Some of its features are:

Safety—Insures closed and locked doors and has indorsement of Liability Companies.

Speed—Permits more rapid and easier operation of doors.

Silence—Absolutely prevents slamming of doors.

The Norton Closer is handled by the Elevator Supply and Repair Company, whose Coast offices are in the Balboa building, San San Francisco.

Contracts already have been entered into to supply the following Coast buildings with the Norton Closer: McCreery building, 12 doors; Nathan Dohrmann building, 15 doors, and the Oregon Hotel, Portland, 30 doors. In the East one of the largest contracts taken is for 625 doors for the Woolworth building, New York; also 120 doors in the Hollenden hotel, Cleveland; 133 doors in the State and Quincy building, Chicago; 102 doors in the Blackstone hotel in the same city and 37 doors in the Franklin building, New York City.

A New Paint Concern

The Pacific Colak Company, with offices in the Merchants' National Bank Building, is just introducing a new line of concrete and damproofing paints, also wall finishes. These specialties are Pacific Coast products, the factory being located in Oakland. Their Concrete Paint for damp cement or brick walls is Dampproof and fire retarding, contains no lead and will stop action of saltpetre.

They claim for their Colak Wall Finish that it is superior to all others for interior decoration. The wall does not need to be sized when Colak is applied. It is a good filler for rough walls and may be applied over old kalsomine.

Colak is the product of a natural volcanic ash, 87% of which is absolutely non-destructible material. Colak can be applied with equal certainty of good results on plaster, wood, brick, concrete or iron.

A color card and other particulars will be mailed architects, contractors or dealers upon application.

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San Francisco, Calif.

Dear Sirs:—I have a number of odd copies of your magazine dated in the years 1906, 07, 08, 09, 10, 11. Have you any call for odd copies to fill files? Thanking you for an early reply.

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Girls' High School Building, San Francisco, in which the California Air Purifying Co.'s Air Washer and Cooler have been installed.

New Buildings Will Now Have Air Purifiers

Architects are beginning to recognize a fact that has long been apparent in the East that in every large building, whether it be hospitals, churches, schools, theatres, public buildings, auditoriums, hotels, banks, office buildings, factories, etc., there should be installed some apparatus for purifying and cooling the air. The California Air Purifying Company are offering an apparatus which seems to have many points to recommend it, and one which is based upon the system used in hundreds of large buildings in Eastern cities with most satisfactory results. It lowers the temperature in summer from 8 to 20 degrees, or the air may be heated in winter by means of a tempering coil.

The Air Purifier, Cooler and Humidifier can be placed in any building where the fan system of ventilation is used. It consists of a large chamber, the casing of which is galvanized iron, copper or concrete, which is braced in a substantial manner and has a plate glass window for making observations of the operation of the spray. By means of the fan the air is made to pass through this chamber where it comes in intimate contact with, first, a finely divided form of water or mist that completely saturates the air, and, second, two sheets of water that clean the air, so that it is impossible for the least particle of air to pass through this chamber without becoming moisture laden and purified.

The air upon striking the sheets of water has the heavier particles of dirt and foreign matter carried down into the tank. The finer particles are carried to the eliminators, where the final work of separation between air and moisture is done.

The means by which this finely divided mist and the sheets of water are formed is by a number of Automatic Spray Heads.

The water is discharged through a large orifice in the spray head against a disc, by which it is broken up into a mist and deflected to form a sheet.

After the air has been passed through the spray chamber and thoroughly purified it is passed on to the eliminators, which remove all the free moisture from the air, and the water thus taken out returns to the settling tank and is used again after being drawn through a series of strainers by means of a centrifugal pump.

The first two eliminator plates with which the air comes in contact have no gutters into which the water may fall. The water falls from the top plate and from each successive plate downward, forming a third complete curtain of water. From these the air is made to come in contact with the

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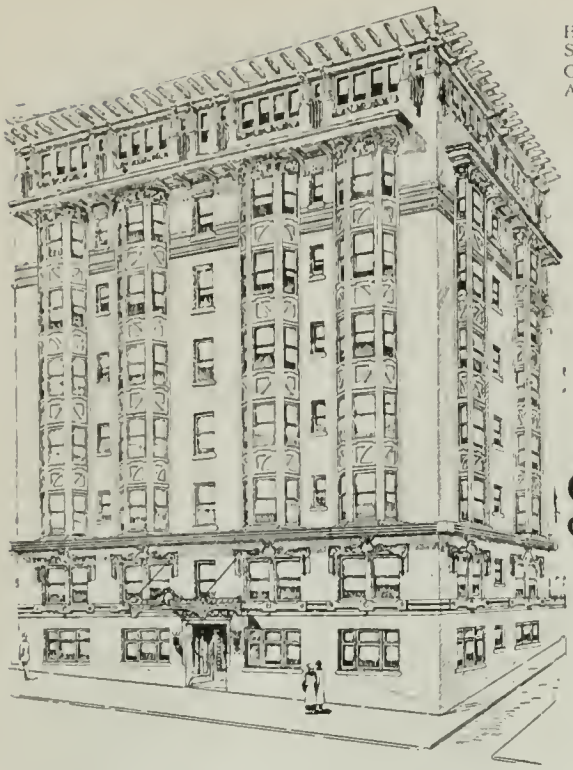

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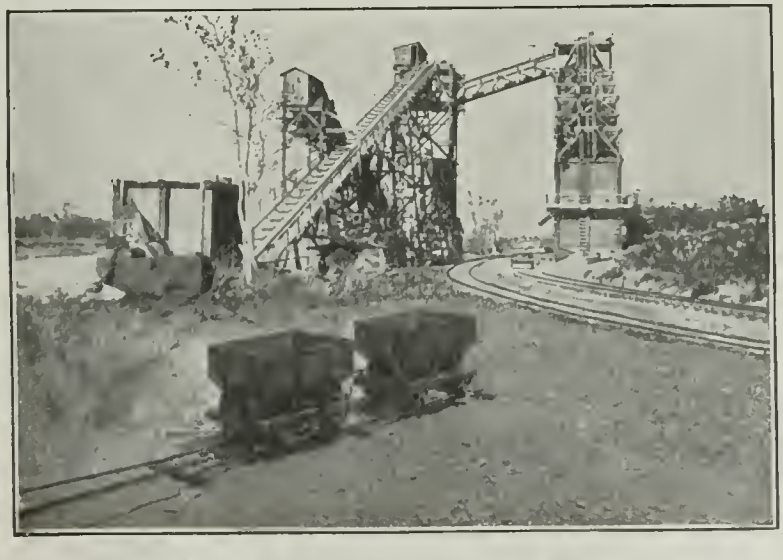

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other eliminator plates, which have gutters at their upper edges that carry the water off and return it to the settling tank. After passing through this progress of elimination there is absolutely no entrained moisture in the air.

The most important parts of the Washer and Purifier are the Spray Heads and the Eliminator. The construction of the Spray Heads renders them absolutely non-cloggable, which is a decided advantage, as one of the greatest difficulties usually to be contended with is the continual stopping up of the Spray Heads, thus rendering the Water Curtain incomplete. The mechanism of the Eliminator is another special feature of the California Air Washer, the eliminating plates having their gutters on the *upper* edges, thus causing a very small resistance to the air passing over them. All free moisture traveling with the current of air is caught and deposited in the gutter and returned to the tank by means of the enclosed return pipes.

The number of Spray heads used in an apparatus depends upon the amount of air to be handled and the conditions under which the apparatus is to be used. The pressure that is advised is from seven to twelve pounds per square inch.

Being a California product, it can be made and installed *much cheaper* than if it was of Eastern construction. As their Engineers are on the ground they can guarantee perfect workmanship, correct installation and successful operation of their apparatus, and in case of any accident they can immediately duplicate any parts. They guarantee that their apparatus will remove 98 per cent of all dirt and dust from the air and they make other guarantees affecting the reducing or the elevation of the temperature in accordance with the character of the equipment.

Among the buildings already equipped (although but recently established on the Pacific Coast) are the new Girls' High School; the new City and County Hospital; the Spalding Building, Portland; the new Clark Hotel, Stockton, and many other important structures.

A form of specification for architects' use is furnished free, also blue print showing data for installations and connections, and efficiency tables for all sizes of machines.

The office is at 376 Fifth street, San Francisco, where Mr. George C. Derby, the efficient General Manager, who has had a life-long experience in manufacturing and installing similar devices, will be found ready and willing to lend advice and suggestions to any one interested.

A National Rock Highway from Coast to Coast

The proposition to build a national rock highway from New York City to San Francisco, which was launched in Indianapolis, by Carl G. Fisher and James A. Allison, owners of the Indianapolis motor speedway, has unquestionably fallen on fertile ground, and the manner in which the automobile industry has taken the matter up gives every assurance that the object will be accomplished.

Already more than $500,000 has been subscribed in Indiana, and those who are pushing the venture believe that the $10,000,000 needed to have the project materialize will come in sufficient time to guarantee the completion of the crushed stone highway in season for the Panama-Pacific International Exposition at San Francisco in 1915.

It is the plan of those interested in the movement to ask every manufacturer of automobiles and sundries of every kind to subscribe one-third of 1 per cent, of their gross receipts for three years, to be paid at the rate of one-third of 1 per cent, a year in quarterly installments, or at the rate of one-fifth of 1 per cent a year for a period of five years.

The plan calls for a road to be built of stone, and the cost of the material will be paid from the fund to be raised according to the plans as represented. Each county through which the road will pass will be asked to do the work of construction, and bear the expense thus incurred, under the direction of engineers furnished by the war department of the United States.

The important feature of the project is that it has not been inaugurated to benefit any particular locality. The originators wish it understood that the movement is for the benefit of the nation at large, and concerns every city and state in the Union. The time which has been set for the closing of subscriptions is Jan. 1, 1913.

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Tables for Designing Structural Steel Columns

IN view of the great demand among structural engineers for a set of tables which would give the safe load on a large number of structural steel columns in common use, the problem of compiling such a set of tables has been undertaken in the civil engineering department of the University of Southern California.

The first problem to be solved was the question of the proper formula to use for unit stresses. The formula used by the different large cities of the United States were obtained and a set of curves plotted which corresponded to these formulae. A curve was then plotted which was the average of all these.

Results from the largest testing laboratories of the United States were then plotted and curves of unit stresses derived from them, and an average of this great mass of results was obtained in one curve. It was gratifying to know that the average of these formulae and the results of practical tests very nearly coincided and that the formulae which best expressed the resulting curve was $p=16000-1/r$, where p= unit stress, l= length in inches and r = radius of gyration in inches.

This formula is also the one accepted by C. C. Schneider in his "General Specifications," which are the standard of the American Society of Civil Engineers.

Values of the unit stresses were then computed for all values of radius of gyration from 0.1 to 6.0 and for every foot of length from three feet to forty feet. A set of curves were plotted giving these values all on one sheet, having a curve for each foot of length.

The next thing was to determine the section of columns to be used. These were obtained from architects and engineers and embrace all the forms in present use, including over five hundred different sections with a possibility of interpolating to include about two thousand, being mostly plate and angle columns, with and without cover plates.

Having determined the columns to be used, all the properties necessary for designing were computed. These include: (a) the area; (b) the radius of gyration about both axes, and in some cases, (c) the eccentricity; (d) the moment of inertia; and, (e) the section modulus, the three latter being used only in special cases.

With these properties and the unit stresses known, it was a very simple process to compute an elaborate set of tables giving the safe loads on each column for each foot of length. In de-

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operating in connection with piping of proper size does the most effective work at the lowest cost. Competitive tests prove conclusively that the TUEC is superior to all other vacuum cleaning systems in the following particulars:

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signing, the engineer could find six or eight columns which would support a given load on a given unsupported length, and from these the one having the least area could be selected. This not only saves about 90 per cent of the engineer's time as compared with the present method of designing, but it also leads to a far more economical design.

These tables have been approved and are being used by some of the best engineers of America and no structural designer should be without them. They may be obtained of Professor C. W. Cook, Civil Engineering Department, University of Southern California, Los Angeles, Cal. Price, $2.50.

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Bankers Investment Building, San Francisco *Fred. H. Meyer, Architect*
"Bestwall" was used in this magnificent "Class A" Building

A New Fireproof Partition

By O. P. SHELLEY, C. E.

FOR years architects and contractors have felt a distinct need for something to take the place of lath and plaster. On the one hand metal lath and plaster is so prohibitive as to cost that its use cannot be considered for residences and most Class "C" buildings, while on the other hand the drawbacks with wood lath and plaster are so numerous as to make its use a decided detriment to the building. The placing of such a tremendous quantity of wood in the shape of lath in the partitions and ceilings all over a building, constitutes one of the greatest fire menaces which the Underwriters have yet had to deal with, and in addition to this is the fact of the inherent lath-stains which so inevitably appear after some months' use, rendering dingy the brightest of wall-papers or the cleanest of tinting. Also, plaster over wood lath is not very sound proof and is easily cracked and shattered.

For these reasons it is not at all surprising that the efforts to find a substitute for lath and plaster have been both varied and numerous and have taken several forms; that of straw, paper or wood-pulp board, which were intended to act as a complete substitute for lath and plaster; secondly, those boards which might be used in place of the lath and the first coat of plaster and on being second coated, would make a complete plastered wall. Of the first mentioned class of boards, namely those consisting of lath or strips of wood, (either imbedded in mastic or veneered with paper on either side), straw board, paper board, or wood-pulp board, the fire risk is, of course, but little better than with wooden lath. Also, moisture will prove inimical to any of them, and while the beautiful effects which can be obtained with some of these boards are too well known to need description, the fact that they always require panelling, cannot be papered over and have not the smooth, unbroken surface of plaster, has militated against their more extensive use and they have not filled the long-felt want for a lath and plaster substitute. It is along the line of the second type of wall-boards mentioned—those which can be plastered over—which contains the most interest for the architectural and building profession. Until recently the great disadvantage of these boards have been their lack of strength, unevenness in thickness and their excessive waste from breakage.

Some time ago a new plaster board appeared on the Chicago market; of fire retardent, mineral composition and which would neither buckle, shrink nor crack when nailed to wooden studding. This board had peculiar properties in that it could be either covered with a skim white-coat of plaster, or could be tinted

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offer the most complete selection of artistic embossed steel ceiling. They represent eleven distinct classes of architecture, each made in a variety of designs, making possible hundreds of beautiful combinations. *Our handsome catalog is well worth having. Write for it to-day.*

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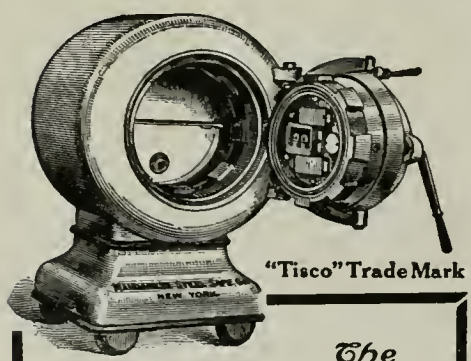

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or papered over and with absolute success in every way. No other wall-board has since shown these qualities and the demand for the wall-board in and around Chicago kept assuming larger and larger proportions so that it was found impossible to obtain any for shipment to the Pacific Coast. For these reasons a few San Francisco capitalists got together and formed a company and bought the Pacific Coast rights to manufacture this plaster board, retaining the old Chicago name, "Bestwall," thus Home Industry came into its own with a very large factory in Alameda, Calif., which is now running full blast manufacturing this board. "Bestwall" is about 3-16 inches in thickness; of an entirely mineral composition; veneered on each side with a special paper covering which is so impregnated and pressed into the composition itself, that on a test made by the Robert W. Hunt Company a few days ago, after soaking a piece of "Bestwall" for eight hours, they were able to report: "No warping; no loosening of surface covering." This fact is so astounding that it would raise considerable skepticism, if it were not vouched for by this well known National Testing Laboratory. As a matter of fact, getting thoroughly damp will ruin practically every other wall-board on the market; hence it is hard to appreciate how a wall-board could possibly be soaked in water for eight hours and after drying be unhurt. As to the fire retardent properties of "Bestwall," it is perhaps best stated by reporting a test which was made at the same time as the dampness test, and also by the Robert W. Hunt Company, in which after a sample of "Bestwall" was exposed to the flame of a Bunsen Gas Burner with the air turned off, the results were as follows:

"The lower surface covering immediately exposed to the flame of the burner, was charred, but did not at any time break into flame. The interior plaster body of the board where it came into immediate contact with the bare flame, was slightly cracked. The under surface covering of the 'Bestwall' board was intact, except it was charred at a point directly over the gas flame. The duration of this test was 10 minutes."

Just what this means from a fire retardent point of view can be better understood when you realize that the "Bestwall" had the covering on either side charred and was slightly cracked, but that it had not burned through. These tests were made in comparison with another wall-board, for the benefit of the Panama-Pacific Exposition Directorate, and not only was the other board ruined by dampness, but the report on the burning test was

"Completely burned leaving only ashes and a few charred fragments after exposure to the flame for eight minutes."

It will surely be but a very short time before the Underwriters' Laboratories at Chicago take cognizance of the extraordinary fire-retardent properties of "Bestwall," at which time an Underwriters' Label will undoubtedly be issued, and until that time it behooves architects to take advantage of this means of cutting down the immense fire risk in their building construction, and the fact that the price erected, will compare favorably with the price of even wood lath and plaster, should make everybody sit up and take notice of "Bestwall."

The Lilley & Thurston Company are the California distributors for "Bestwall."

There Are Lots of Zenos in This World

This is a story about Zeno. Zeno was a colored man who had a savings account in a bank in a Southern city years ago, before the days of modern banking laws. One day the bank failed and Zeno was naturally very much perturbed (he didn't know it by that name, but the effect was just the same). He hung around the door of the bank without any real notion of why he was doing it, but simply to be near his money. The receiver one day, as he came out of the door, asked Zeno why he stayed so close to the bank all the time.

"'Kaze I'ze got some money in dat 'ar bank an' Ah wants to git it."

"Well," replied the receiver, "don't you know that the bank has to be thoroughly examined before any of the depositors can get their money?"

See Advertisement on Page 175

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WAINWRIGHT CORNER BAR

THE LILLEY & THURSTON CO.

Telephone Kearny 2546 **Rialto Bldg., San Francisco**

"Dat's all right," said Zeno, "but Ah jes' nacherally wants mah money."

"Of course, you do," responded the receiver, "but you know that you can't get it until everything is straightened up. You know that banks have failed before. This isn't the first time that a bank has busted."

"Shore Ah knows dat; Ize heard tell o' banks bustin before dis, but dis here am de fust time dat a bank has ever busted right squah in mah face." (Laugh here.)

The examination of the bank went on and ultimately the recciver announced that the depositors would be paid off and in alphabetical order. Unfortunately some mistake had been made in the figuring and when they got down to the W's the money gave out and Zeno lost his savings.

This experience, however, did not entirely discourage him, for after several months he had managed to save up some more money, and he took it over to another bank, where he was known and told the cashier he would like to open a savings account. The cashier was agreeable, and said, "All right, Zeno, we will be glad to open an account for you."

"Zeno, nothin'," said the darky, "mah name ain't Zeno no more, mah name's Ajax."

Some Interesting Points About the Panama-Pacific International Exposition

The Court of Honor will be entirely surrounded by a colonnade comprised of massive arches. Groups of statuary symbolizing the rising and the setting sun will surmount the colonnade.

The dominating theme of the Exposition from an architectural viewpoint will be the huge tower of the Administration Building, 425 feet high and flanked on either side by the gilded domes, towers and minarets of the remaining buildings of the group.

The largest building group in the Exposition will be the Palaces of Agriculture, covering in two sections a floor area of 680,00 square feet.

Hundreds of thousands of trees, shrubs and vines are ready to be removed at the proper time and set out in accord with the plan that will harmonize with the architectural and color scheme of the buildings.

One of the most striking of the Exposition palaces will be the Horticultural Building, whose domes and minarets will rise up 100 to 125 feet. The building will be constructed of glass.

The concessions and amusement center will occupy 65 acres, the Manufacturers Building an area of 276,250 square feet. The total area of the main exhibit palaces in square ground feet will be 3,731,500.

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THE PARAFFINE PAINT CO.

34 First St., San Francisco

Sanitary Garbage Disposal a Necessity

NEW MODEL BRADSHAW
Improved Garbage Chutes
at Much Reduced Prices

DO YOU realize that the proper disposal of garbage is absolutely essential in a building of any description? You know and we know that individual slop buckets in apartment houses and the use of dumbwaiters for the carrying and conveying of both garbage and food supplies, is *positively* unsanitary. Do you know that the garbage can, as used at present, allows your building to be invaded by disease germs and your back stairs and porches by a none too clean scavenger? A sanitary method of disposing of waste is of the utmost importance in any building. Almost every communicable disease has been traced to the old style chutes and garbage cans.

The ***Bradshaw Sanitary Garbage Chute*** effectually solves your problem of garbage disposal, and our experience has made us experts in these problems. Do you know that we are installing this garbage chute for practically the price of the old style, foul-malodorous contrivance? Our old price list has been reduced forty per cent and a far better article presented to the trade. The ***Bradshaw Sanitary Garbage Chute*** has come to stay, and eventually the garbage can, a relic of the dark ages, will go. You owe it to yourselves and to your clients to look into the merits of our article.

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Constant investigation along the oil storage line for so many years has placed us in a position of authority on this subject. We have accumulated much information of importance to architects and contractors. If you are interested we will be glad to forward our complete set of bulletins No. 107 upon request.

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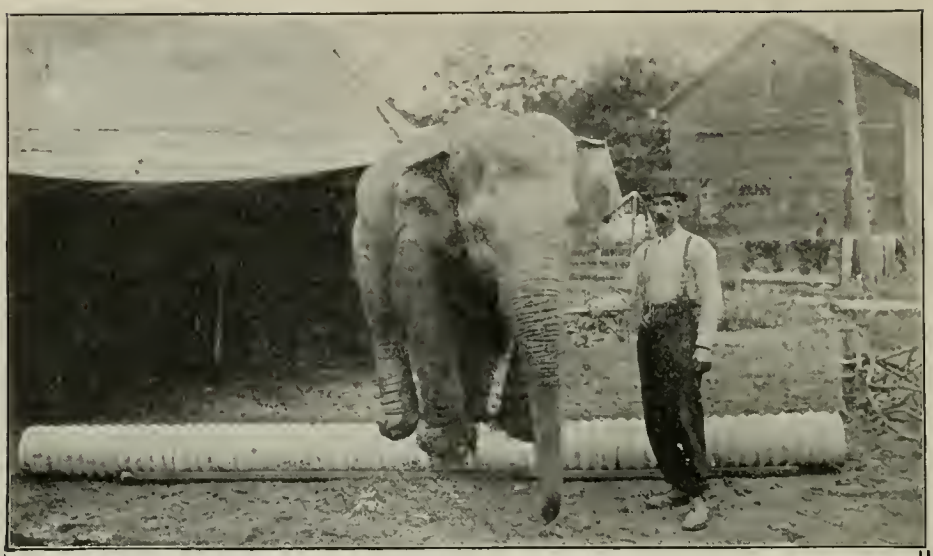

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in which the disposition of the material is a perfect application of the principle of the I-beam, and the overlapping joints are actually the strongest portion. They possess the absolute maximum of strength in proportion to weight.

Their material is the PUREST and therefore the MOST DURABLE iron ever produced in commercial quantities.

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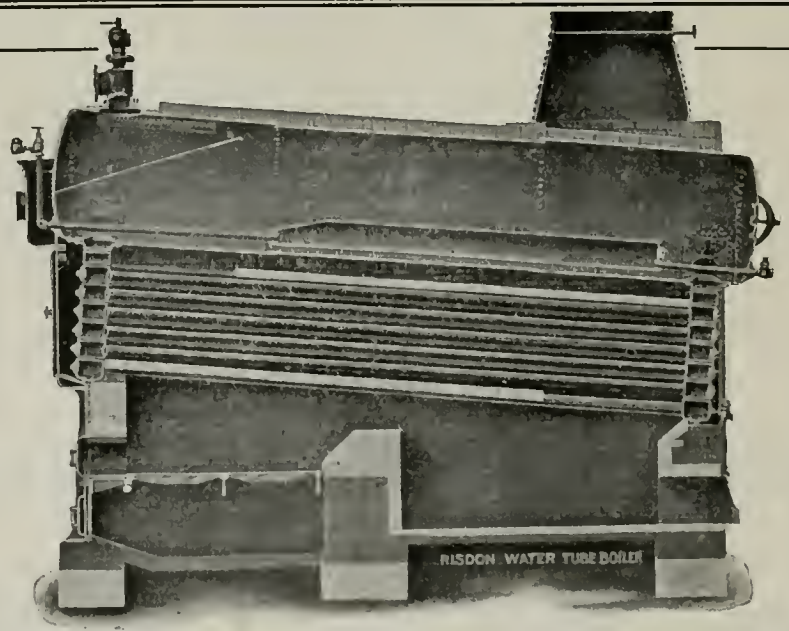

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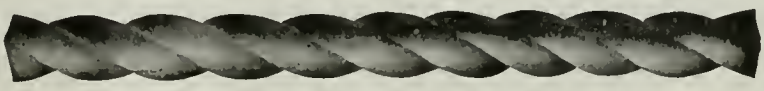

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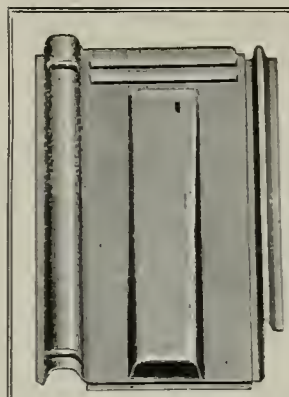

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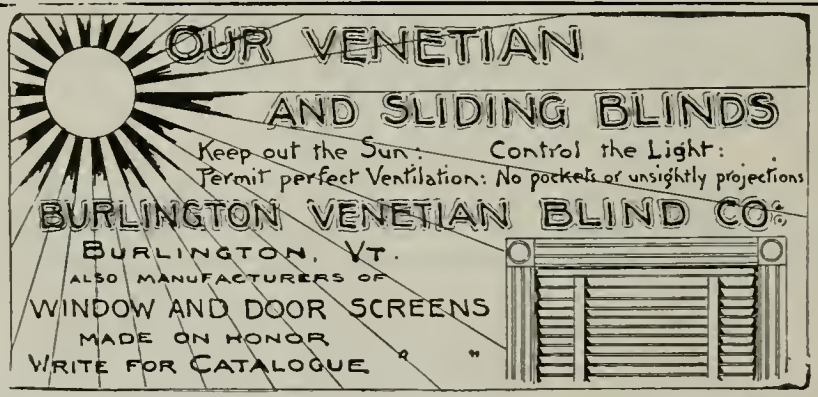

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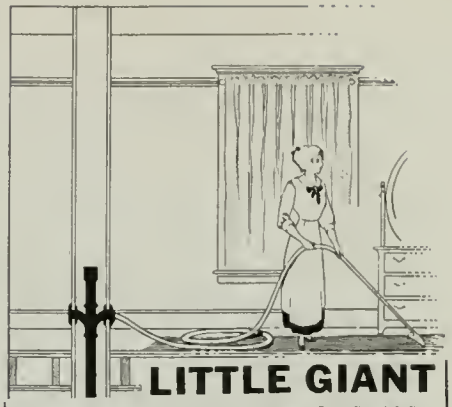

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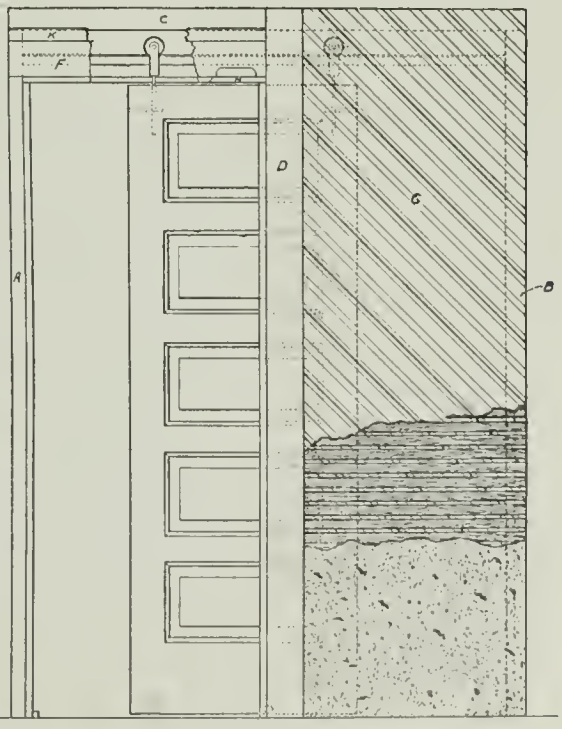

Fig 4

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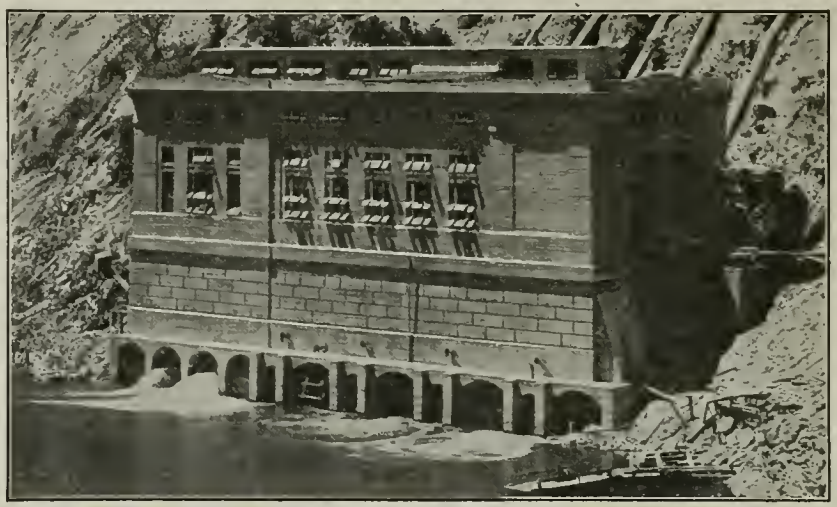

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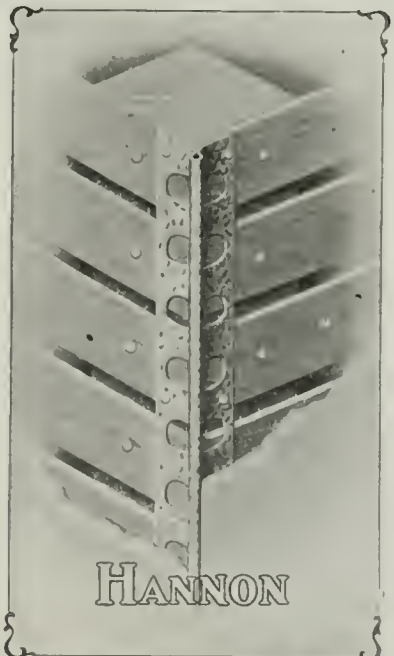

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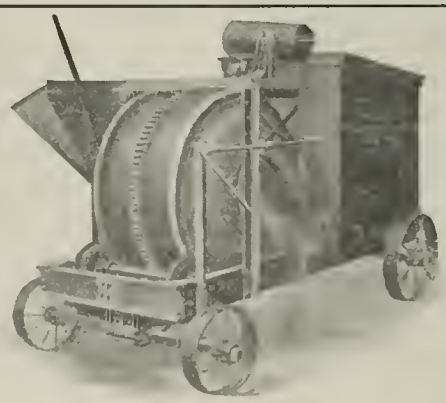

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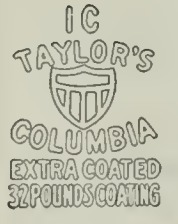

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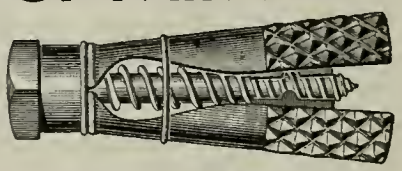

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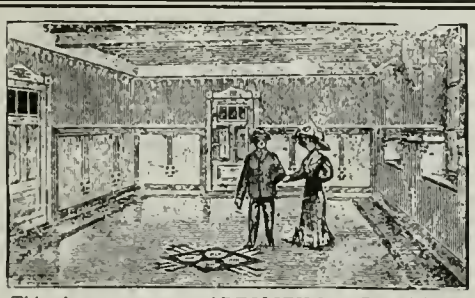

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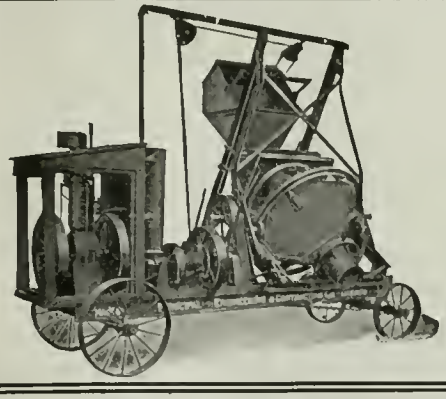

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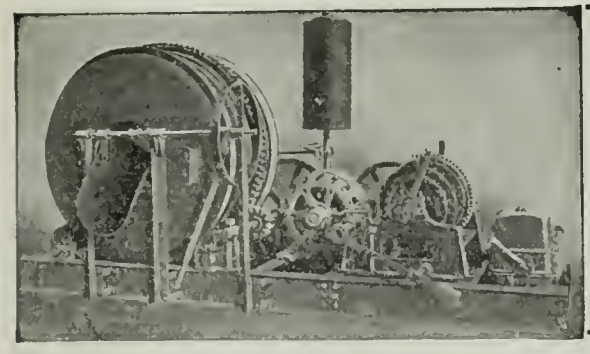

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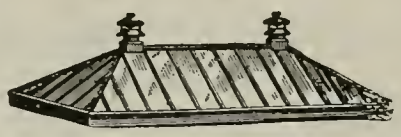

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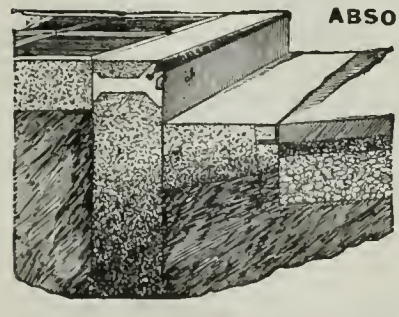

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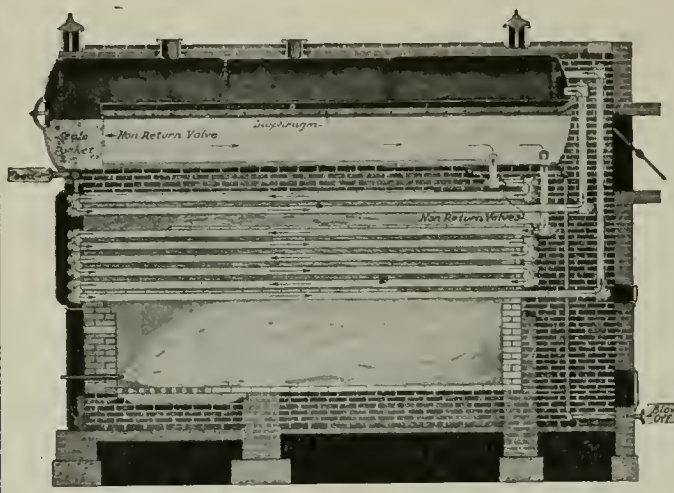

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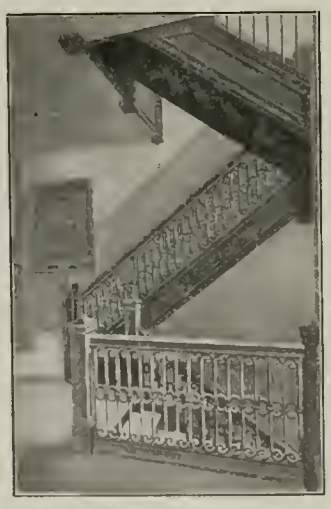

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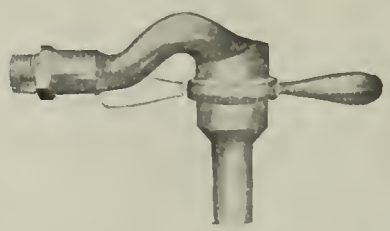

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